Scientific Excellence • Resource Protection & Conservation • Benefits for Canadians
Excellence scientifique • Protection et conservation des ressources • Bénéfices aux Canadiens

The Impact of Acidification on the Economic Value of Recreational Fishing in Eastern Canada

Economic and Commercial Analysis
Report No. 14

Fisheries and Oceans Pêches et Océans

Canada

92-06449/

The Impact of Acidification on the Economic Value of Recreational Fishing in Eastern Canada

Economic Analysis and Statistics Division
Economic and Commercial Analysis Directorate
Department of Fisheries and Oceans
Ottawa, Ontario
K1A 0E6

March 1989

Report prepared by:

Luc Michaud Inc.
Montreal, Quebec

(Department of Fisheries and Oceans
Contract no. FP 802-8-2598-01-SS)

Economic and Commercial Analysis
Report No. 14

The contents of this report are the responsibility
of the contractor and do not necessarily reflect the
official policies of the Department of Fisheries and Oceans

This report was prepared by:

Luc Michaud Inc., Montreal, Quebec H4N 1C5
under Department of Fisheries and Oceans
Contract No. FP802-8-2598-01-SS

PUBLISHED BY:

Communications Directorate
Department of Fisheries and Oceans
Ottawa, Ontario
K1A 0E6

DFO/4231

©Minister of Supply and Services Canada 1989
Catalogue No. Fs 66-5/14E
ISBN 0-662-16919-0
ISSN 0843-5626

Correct citation for this publication:

Michaud, L. 1989. The Impact of Acidification on the Economic Value of Recreational Fishing in Eastern Canada. Econ. Commer. Anal. Rep. No. 14: 125 p.

Également disponible en français sous le titre «L'impact de l'acidification des plans d'eau sur la valeur économique de la pêche récréative dans l'est du Canada»

TABLE OF CONTENTS

		Page
Table of contents		**iii**
List of figures		**v**
List of tables		**vi**
Abstract		**vii**
Preface		**ix**
Acknowledgment		**x**
Summary		**xi**
Introduction		**1**
Chapter 1	**Overview of the travel cost method**	**3**
1.1	Choice of the "travel cost" approach	3
1.2	Estimation of the benefits from recreation sites	4
1.3	Estimation of the value through transportation expenses	5
1.4	Data base for the implementation of the travel cost method	8
1.4.1	1985 survey on sport fishing in Eastern Canada	8
1.4.2	Calculation of average duration of trips of non-residents	10
1.4.3	Establishment of time and travel cost estimates	12
Chapter 2	**Development of a biological productivity index**	**13**
2.1	Measurement of acidity levels in fishing regions in Eastern Canada	13
2.2	Development of a biological productivity index	13

Chapter 3 **Model of the demand for recreational fishing in Eastern Canada** **19**

3.1 Theoretical basis of the model 19

3.2 Econometric estimation of the model 19

3.2.1 Sample 20
3.2.2 Functional form of the demand equation 20
3.2.3 Econometric estimation of the demand equation 20

3.3 Analysis of regression results 21

Chapter 4 **Economic benefits of recreational fishing** **23**

4.1 Demand curve for recreational fishing in each region 23

4.2 Simulation of the effects of acidification on the economic value of recreational fishing 32

4.3 Analysis of results 35

Conclusion **41**

Bibliography **45**

Appendices **47**

LIST OF FIGURES

Figure 1: Location of towns 5

Figure 2: Demand curve for the recreation experience 6

Figure 3: Recreational fishing demand curve 7

Figure 4: Demand for the recreation experience 24

Figure 5: Demand for recreational fishing 26

Figure 6: Calculation of the loss in consumer surplus 32

Figure 7: Variation of economic value 44

LIST OF TABLES

Table 1:	Number of visitors to stream A	5
Table 2:	Estimation of transportation cost increases	6
Table 3:	Fishing days per origin/destination	9
Table 4:	pH and average BUE per fishing region	14
Table 5:	Regression results	22
Table 6:	Demand for recreation experience	25
Table 7:	Increase in entrance fees	27
Table 8:	Demand for recreational fishing	28
Table 9:	Calculation of consumer surplus	30
Table 10:	Calculation of simulated days	33
Table 11:	Differences in consumer surplus	36
Table 12:	Differences in fishing days	38
Table 13:	Differences in surplus in discounted values	42
Table 14:	Average value of a fishing day	42

ABSTRACT

This study, which is based on a previous study done in Quebec., considers the economic impact of acidification in Eastern Canada. This report attempts to predict the implications related to different acidification scenarios. In total, five hypothetical scenarios are evaluated using the travel cost method.

If there had been no acidification, present demand would be 68.6 million fishing days annually rather than 55 million. The loss incurred since the onset of acidification is $ 553 million (1988 $) per year. If the acidification level was to be maintained, 14.4 million additional fishing days would be lost each year, representing $ 4.4 billion of net loss over the next 50 years relative to 1988. If Canada were to reduce its own air emissions the net loss would be reduced to 9.1 million fishing days for a total impact of $ 2.9 billion over 50 years. If Canada and the United States joined their efforts to reduce 42 % of acid emissions affecting our regions, the losses would be limited to 4.6 million fishing days corresponding to a net economic loss of $1.5 billion over 50 years.

Finally, a pessimistic scenario which considers an increase of 10 % in acid emissions would cause a reduction of 16 million fishing days. The equivalent net economic loss would be $ 4.8 billion over 50 years.

This study demonstrates the magnitude and importance of the impact of acidification on the Canadian economy, related to recreational fishing.

RÉSUMÉ

La présente étude, qui est basée sur une étude antérieure au Québec*, porte sur l'impact économique des pluies acides dans l'est du Canada. Ce rapport a pour but de prédire les implications reliées à différents scénarios d'acidification. Au total cinq scénarios hypothétiques ont été évalués utilisant la méthode des coûts de transport.

Il est donc estimé qu'en 1988, s'il n'y avait pas eu d'acidification, la demande pour la pêche récréative s'établirait à 68,6 millions de jours de pêche au lieu de 55 millions. Ceci représente une perte nette encourue de 553 millions de dollars ($1988) par année. Si l'acidification continue au même rythme qu'aujourd'hui, 14,4 millions de jours de pêche seront perdus équivalent à une perte de 4,4 milliards de dollars actualisés sur une période de 50 ans avec 1988 comme année de référence. Si le Canada s'engageait à contrôler ces émissions acides, la perte se chiffrerait à 9,1 millions de jours de pêche représentant une perte économique nette de 2,9 milliards de dollars pour une période de 50 ans. Si le Canada et les États-Unis réussissaient conjointement à diminuer de 42 % les émissions acides au Canada, la perte ce limiterait à 4,6 millions de jours de pêche correspondant à une perte économique nette s'élevant à 1,5 milliards de dollars pour une période de 50 ans. Finalement, un scénario pessimiste considère une augmentation de 10 per cent des émissions acides. Ceci se traduirait en une réduction de 16 millions de jours de pêche. La perte économique nette serait alors équivalente à 4,8 milliards de dollars pour une période de 50 ans.

Cette étude vise à démontrer l'ordre de grandeur et l'importance de l'impact des précipitations acides sur l'économie canadienne relié à la pêche récréative.

*** The Impact of Acidification on the Economic Value of Recreational Fishing in Quebec (aussi disponible en français)**

PREFACE

Recreational fishing is one of the most popular outdoor activities in Canada. In 1985, about 5.6 million residents and more than 916,000 visitors from outside Canada, fished a total of 74 million days. Direct spending by recreational fishermen in 1985 totalled $4.4 billion and generated significant economic activity.

There is increasing recognition that acidic precipitation or "acid rain", as it is more commonly known, impairs the biological productivity of fish habitat in Canada, making game fish more scarce and undermining the attractiveness of the recreational fishing experience. This impacts directly on the recreational fishing industry by reducing fishing effort and related expenditures.

This report was produced by Luc Michaud Inc. at the request of the Department of Fisheries and Oceans under the auspices of the LRTAP (Long Range Transport of Airborne Pollutants) program. The purpose of this report is to assess the economic loss resulting from acidification in Eastern Canada. Various acidification scenarios are considered in order to demonstrate to the readers the impact of several situations that could affect the Canadian economy.

This study follows a similar report conducted in Quebec (Report no. 1), which entails using the travel cost method and including a biological variable (Biomass per Unit of Effort) in the econometric model. This report was prepared also using the travel cost method and was supported by a peer review committee.

ACKNOWLEDGMENT

This study was made possible through the co-operation of a team of specialists whose qualifications and experience deserve mention. We would like to thank Keith Brickley, Hervé Déry and François Boulanger from Fisheries and Oceans Canada, who assisted us in using the results of the 1985 Survey of Sport Fishing in Canada. The development of a biological productivity indicator was made possible through the research of Robert Vaillancourt and Sylvie Cloutier from LOGIMER, in Quebec City.

The project team was composed of Christian Martin and Pascal Dessain and was directed by Luc Michaud, all members of LUC MICHAUD Inc.

SUMMARY

The purpose of this study is to develop an econometric model to quantify the impact of the acidification of lakes on the economic value of recreational fishing in Eastern Canada. The economic value of fishing is defined by the concept of consumer surplus, a monetary assessment of the satisfaction gained by the user from engaging in recreational fishing.

The model is based on the relationship, which has been determined by biologists (Frenette, 1986,1987), between the acidity of a body of water and its biological production, measured in biomass per unit of fishing effort (BUE). In this study, we confirmed the existence of a significant relationship between BUE and the number of fishing days (Michaud, 1987) for all of Eastern Canada (Quebec, Ontario, Maritimes).

With the model, therefore, it is possible to predict the impact of acidification on the number of fishing days in each of the 64 fishing zones of Eastern Canada. The monetary value corresponding to fishing demand is measured using Clawson-Knetsch's travel cost method, which is commonly used for this type of analysis.

The economic loss related to a decline in biological productivity is represented by a reduction in the number of fishing days and a decline in satisfaction of the remaining users. It is expressed in current dollars per year. In order to provide a more general view of the economic impact of the problem, these sums were discounted over a period of 50 years at an annual rate of 10 per cent. The discount reference year is 1988.

Several hypothetical scenarios for the acidification of lakes were provided to us by the Department of Fisheries and Oceans.

- **"Current"** scenario: This scenario represents the current pH values of the bodies of water in our regions, obtained by analyzing water samples taken in each fishing region. Acidification has already had substantial effects. According to our calculations, if there had been no acidification, present demand would be 68.6 million fishing days rather than 55 million, as revealed by the 1985 Survey of Sport Fishing in Canada. The economic value of the fishery in Eastern Canada is currently evaluated at $2.3 billion per year. The loss incurred since the onset of acidification is $553 million per year.

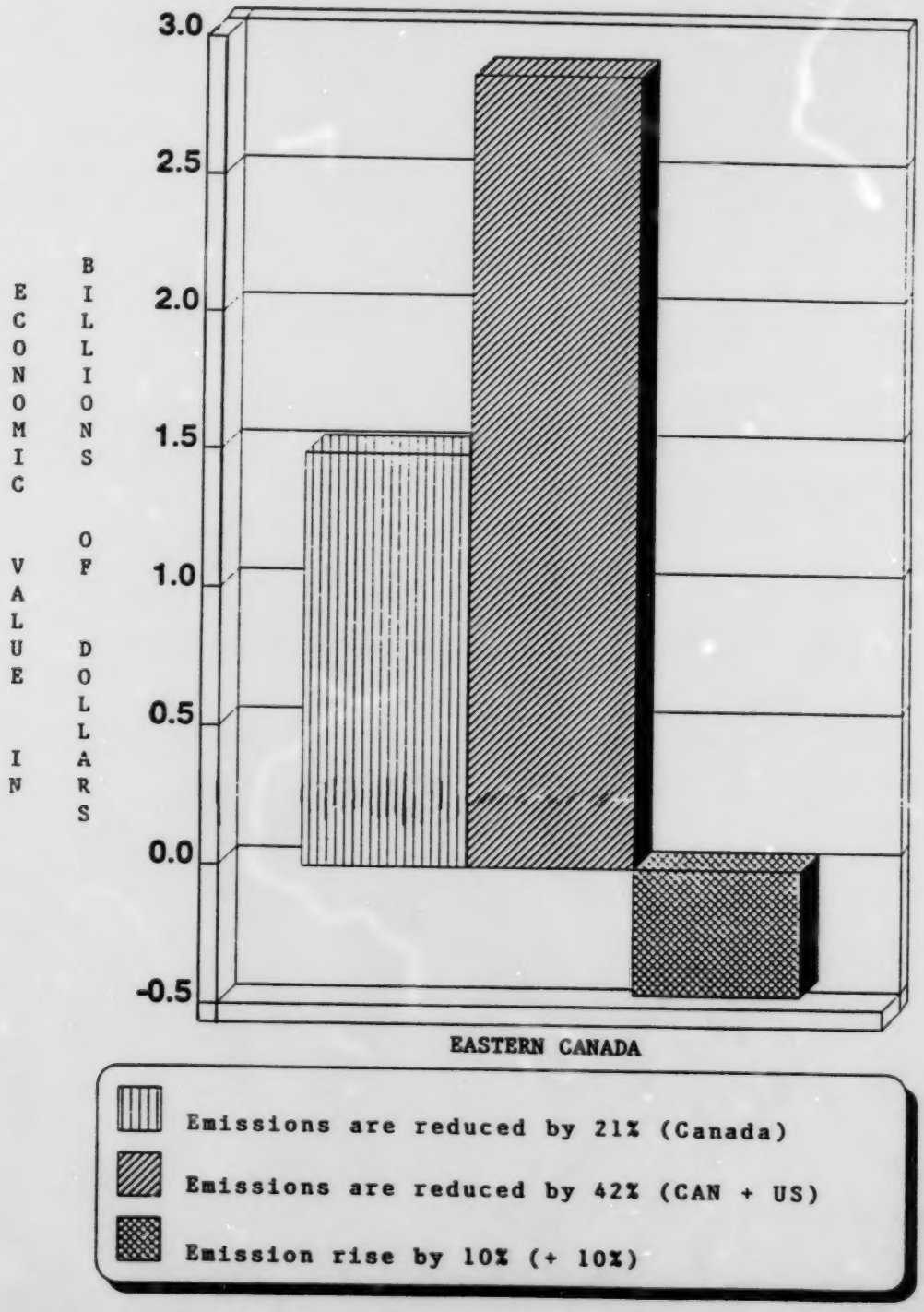
- "Maintenance of acid emissions" scenario **(Status quo):** Fishery resources would continue to deteriorate at the same rate as today until the pH level becomes stabilized within ten years. By then, demand would have fallen by 14.4 million fishing days (26% of the current total). The corresponding economic loss in discounted 1988 dollars would total $4.4 billion.

- "Emissions control by **CANADA**"scenario: Toxic emissions which affect Eastern Canada would be reduced by 21 per cent. When the pH level stabilizes, fishing demand would have fallen by only 9.1 million fishing days (17 per cent of the current total). The corresponding economic loss in discounted 1988 dollars would total $2.9 billion, which is $1.5 billion (34 per cent) less than the loss that would be incurred if the rate of acid emissions were maintained at the current level.

- "Emissions control by Canada and the United States" scenario **(CAN + US)**: The adoption of stringent environmental protection measures by Canada and the United States would lead to a 42 per cent reduction in the acid emissions which affect our regions. When the pH level stabilizes, the fishing demand would have fallen by only 4.6 million fishing days (8 per cent of the current total). The corresponding economic loss in discounted 1988 dollars would be $1.5 billion, which is $2.9 billion less than the loss that would be incurred if the rate of acid emissions were maintained at the current level.

- **"+10%** scenario": The inverse situation was also considered, whereby a laissez-faire policy concerning the environment would result in a 10 per cent increase in the acid emissions affecting Eastern Canada. When the pH level stabilized, the fishing demand would have fallen by 16 million fishing days (29 per cent of the current total). The corresponding economic loss in discounted 1988 dollars would be $4.8 billion, which is $400 million (10 per cent) greater than the loss that would be incurred if the rate if acid emissions were maintained at the current level.

VARIATION IN THE ECONOMIC VALUE OF THE FISHERY IN DISCOUNTED DOLLARS BASED ON AN EMISSIONS CONTROL POLICY



INTRODUCTION

The acidification of surface waters is now recognized as an important factor in the decline of fish stocks. We can expect that this, in turn, reduces the attractiveness of fishing trips and is reflected in a drop in the number of days spent fishing.

It is now widely accepted that leisure activities have an economic value, although it is difficult to quantify their market value. Economists have been studying this question since the mid 1960s, and considerable basic and applied research has been conducted on it. Although this question continues to be the subject of intense debate, a number of methods are now generally accepted for economic policy purposes.

The objective of this study is to apply the travel cost method to the problem of estimating the economic loss suffered by anglers caused by the acidification of watercourses in Eastern Canada. This study follows a similar study conducted in Quebec and published in August 1987 by the Department of Fisheries and Oceans. The objective is to obtain figures which can be defended and used in international discussions on acid rain.

There are two main challenges to be met in this study:

- First, the successful application of the travel cost method to a given area requires a sizeable amount of data consisting of the proper structure. Since this study must rely on existing surveys which were not initially designed for this purpose, there is some degree of uncertainty as to whether the data base is appropriate for the application of the travel cost method.

- Second, the relationship between acidity conditions and fishing demand must form an integral part of the policy simulation model if it is to be truly useful in the decision-making process. The lack of empirical data on the relationship between acidity conditions and the economic value of fishing would compel managers to rely on assumptions. Thus, the integration of the impact of acidity into the fishing demand model would appear highly desirable. Very few studies have been conducted in this field.

The first chapter of this report presents an overview of the principles underlying the travel cost method and the estimate of the economic value of natural resources-based recreational activities. It concludes with a description of the sources of data on fishing activity, fish stocks and travel variables.

The entire second chapter discusses the development of a biological quality index linked to acidity conditions and designed to describe the attractiveness of fishing areas to anglers.

The third chapter shows how these data were integrated into an econometric model of demand for recreational fishing in Eastern Canada. A technical discussion of alternative formulations supports the choice of the model to be used in the decision-making process.

The final chapter explains how the model can be used to estimate the economic value of the decline in fishing activity caused by the acidification of surface waters. The authors use five acidification scenarios developed by Fisheries and Oceans Canada and, on the basis of the model developed in the preceding chapter, they calculate the number of fishing days, the consumer surplus and losses due to acid rain.

CHAPTER 1

OVERVIEW OF THE "TRAVEL COST" APPROACH FOR APPRAISING THE ECONOMIC VALUE OF LEISURE ACTIVITIES AND ITS DATA REQUIREMENTS

1.1 Choice of the "travel cost" approach

As the title suggests, the purpose of this section is to review the main characteristics of the "travel cost" approach, which was chosen by Fisheries and Oceans as the one to use for this study.

In short, it relies on the distance people travel to estimate, in monetary equivalents, the value of the leisure experience. This method was created by Clawson and Knetsch ((1966); since then many improvements have been suggested to the initial procedure while numerous alternative techniques have been developed.

Even though the choice of the method was not the responsibility of the consultant, we feel it is important to state that the "travel cost" approach is the most widely recognized and accepted methodology for valuing leisure activities, especially fishing.

Although specialists may express reservations and prefer different methods, which they are expected to do as dedicated researchers, all will agree that the "travel cost" method can be a useful tool for policy analysis.

The reader interested in learning more about the respective merits of alternative approaches for valuating a non-market good is invited to consult the bibliography. In the next section the focus will remain on the "travel cost" method.

1.2 Estimation of the benefits from recreation sites

A crude index of the utility of a recreation site is the number of people who go there. But obviously the satisfaction offered can vary greatly among activities at a given site, and from one site to another for a given activity. If leisure activities were all traded on markets, observation of prevailing prices would give a measure of the value of these goods.

The absence of a market price does not mean that the good or service has no value. Even if all agree with this truism in principle, the market system tends to divert resources towards the production of marketable goods. One of the responsibilities of public policy makers is to ensure that highly valued non-market goods are not "exchanged" for market goods of inferior value. Such a comparison requires that values be measured on a common scale, usually money.

In the vast majority of cases, the question is not a matter of principles but merely a matter of quantifying correctly the values to be compared. This requires estimating a "monetary equivalent" value for non-market goods by answering either of two questions:

- "If the public good was made available through a free market, how many consumers would purchase it, and at what price?"

- "What sum of money would we have to give to users of a public good for them to freely accept not to use it any more?"

Both questions are theoretically correct, but they are equally impractical. They also give much different dollar values. (Clawson and Knetsch, 1966). Direct questioning of users about hypothetical events is not considered reliable by some experts because of the gap between consumer intentions and actual decisions, and also because of the possibility of intentional bias.

The methods used to discover the monetary equivalent of the satisfaction given by non-market goods should as much as possible be based on the analysis of the actual behaviour of consumers. The "travel cost" method is one such approach.

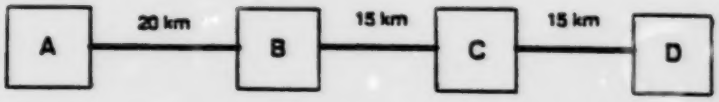
1.3 Estimation of value through transportation expenses

The "travel cost" method relies on the observation of fishing behaviour related to transportation expenses.

The first step in the process is to establish the relationship between the visit rate for a given recreational site and the travel cost of users. This is called the demand curve for the whole recreational experience and can be used to predict the responses of anglers to the introduction of varying levels of entrance fees, thus constructing a demand curve for sport fishing.

The method can best be explained with a simple example borrowed from Wooley (1985) where a stream located at point A is visited by anglers living in towns B, C, and D (Figure 1).

FIGURE 1: LOCATION OF TOWNS



Since there is no entry fee, all costs are related to travel costs. Table 1 shows the cost to anglers from each of the three towns and the numbers of visits (in angler days).

TABLE 1: NUMBER OF VISITS TO STREAM A

TOWNS	POP.	TRAVEL COSTS($)	VISITORS/ YEAR	VISIT RATE
B	1 000	4	400	0.40
C	1 000	7	250	0.25
D	1 000	10	100	0.10

These data are used to construct the demand curve for the whole recreational experience at site A (Figure 2). This recreational experience includes anticipation, travel to the site, experience, travel back and recollection.

FIGURE 2 : DEMAND CURVE FOR THE RECREATIONAL EXPERIENCE

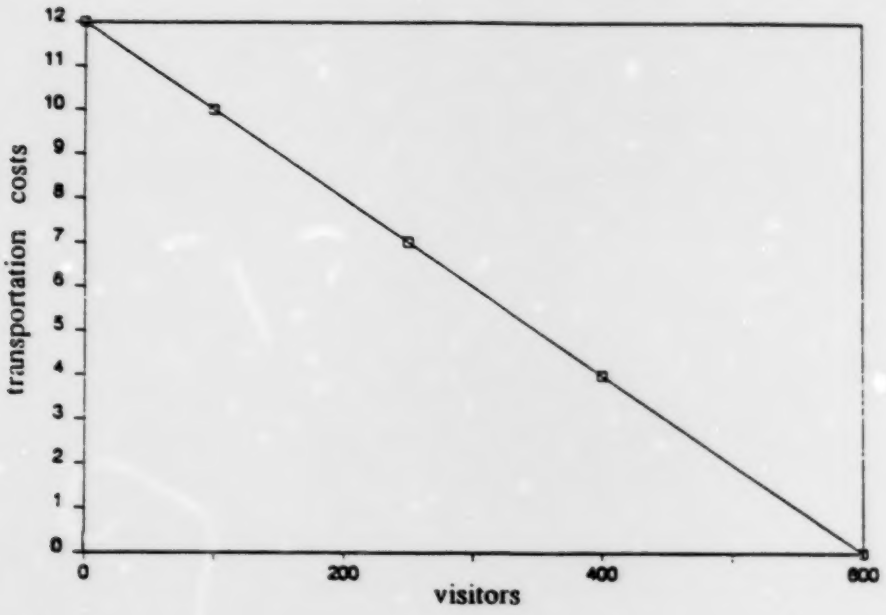


TABLE 2 : ESTIMATION OF TRANSPORTATION COST INCREASES

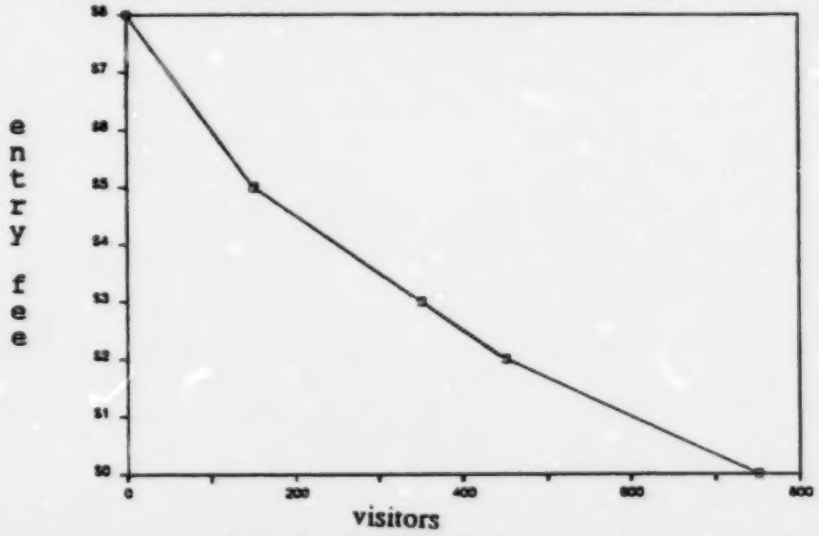
TOWN	Present Cost	Present Visits	$ 2.00 Entry fee Cost	Visits	$ 3.00 Entry fee Cost	Visits	$ 5.00 Entry fee Cost	Visits	$ 8.00 Entry fee Cost	Visits
B	$ 4	400	$6	300	$7	250	$9	150	$12	0
C	$ 7	250	$9	150	$10	100	$12	0	$15	0
D	$ 10	100	$12	0	$13	0	$15	0	$18	0
TOTAL		750		450		350		150		0

From this curve it is possible to determine the total number of visit that would result if the transportation costs were increased as shown in Table 2.

For each level of entry cost, the number of visits per year is shown in Figure 2. For example with a five dollar entry fee, the entry cost for anglers in Town B of fishing in Stream A is $9. From Figure 2, it can be seen that a $9 entry cost is associated with 150 visits per year.

The demand curve for fishing is obtained by plotting the total visits in Table 2 against entry fee (Figure 3). The area below this curve gives the total benefits to anglers from fishing Stream A, or consumer surplus created by this experience.

FIGURE 3 : RECREATIONAL FISHING DEMAND CURVE



In order to construct such demand schedules, it is necessary to know the origin of the visitors and their transportation expenses. Origin/destination surveys can provide the former. Travel costs can be obtained by direct questions or calculated with maps. In the latter case, some questions arise as to what must be included in travel costs: for example, should car depreciation be added to out of pocket expenses? A more significant issue is the inclusion of a value for the time spent travelling (Wilman, 1980)

Economists familiar with transportation issues are aware of the fact that consumers are willing to pay to reduce travel time. Many studies point to values of time saved ranging between 15 to 40 per cent of the average hourly earnings (Cesario, 1976).

The advisability of including this cost element in all cases is questioned by some on the grounds that the travel experience can be part of a whole experience and even create satisfaction. This argument may appear valid for scenic areas of high interest. However, it would be far-fetched to apply it to the highways and roads used to get to fishing areas in Eastern Canada. Therefore, the inclusion of the value of travel time as a cost element appears justified in the present case.

1.4 Data base for the implementation of the travel cost method

1.4.1 1985 survey on sport fishing in Canada

Surveys were conducted in each province of Eastern Canada (Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland) in order to determine the characteristics of anglers.

Slightly more than 32,000 resident and non-resident anglers (who had purchased a licence in one of the provinces under study) completed and returned the survey: 16,685 from Ontario, 7,628 from Quebec, 4,546 from New Brunswick, 1,264 from Nova Scotia, 800 from Prince Edward Island and 1,476 from Newfoundland.

A special computer program in Quick C was developed to compile the fishing days and catches by origin and destination. It should be noted that the destination of non-residents was not always recorded in the same way as it was for residents, particularly with respect to Quebec, where only five fishing zones were used for non-residents and thirteen for residents. The thirteen zones were contained in the five zones.

In order to be able to include the activity of non-Quebec residents in the demand equations, as was required by the methodology, the number of fishing days of non-residents was distributed among the sub-regions composing each of the five zones in proportion to the breakdown of observed activities of Quebec residents. For example, if two thirds of the fishing days of Quebec residents took place in a given sub-region, then two thirds of the fishing days reported by non-residents in the zone were assigned to that sub-region.

Table 3 presents the origin/destination matrices of fishing days in Quebec for all species. The other provinces are presented in Appendix 3. In Quebec, the Montreal region has the most fishing days (2,555,426, or 16 per cent of the total), followed closely by the Saguenay/Lac-Saint-Jean region (1,847,896, or 12 per cent) and the Eastern Townships (1,630,955, or 11 per cent).

In Ontario, fishing activity was found to be highest in the central region, with 8,642,234 fishing days (25 per cent of the total), followed by the Algonquin, Eastern and southwest regions, which each account for roughly 15 per cent of the total number of fishing days.

TABLE 3: FISHERY DAYS BY ORIGINS/DESTINATIONS

LOC RICHAUD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest #200
Montréal, Qc, H4N 1C5

ORIGINS		DESTINATIONS													
		Region A	Region B	Region C	Region D	Region E	Region F	Region G	Region H	Region I	Region J	Region K	Region L	Region M	Total Days Total Resp.
	Gaspésie	532547	161942	862	3400	-	-	-	3936	2660	669	9715	5075	6266	727079
		(1253)	(55)	(1)	(2)	-	-	-	(3)	(1)	(1)	(5)	(3)	(3)	(204)
	Saguenay	7145	3578	-	-	-	-	-	6752	27670	4247	997866	13118	70436	1133161
		(3)	(2)	-	-	-	2348	-	(3)	(12)	(2)	(177)	(8)	(12)	(221)
	Québec	118022	313614	268112	27157	11117	(1)	-	22070	825644	10857	281514	27773	24939	2148399
B		(13)	(63)	(29)	(8)	(1)	-	17579	(2)	(111)	(3)	(56)	(8)	(4)	(305)
U	Trois-Riv.	12113	2405	144140	208849	2168	13257	14201	326613	94829	47291	55813	-	1325	1075003
E		(4)	(2)	(20)	(53)	(2)	(5)	(2)	(64)	(29)	(14)	(14)	-	(1)	(222)
B	East. Town.	29408	25886	532952	6467	8128	1698	8152	19709	4010	12303	24613	8266	4001	675093
E		(11)	(14)	(218)	(15)	(8)	(2)	(4)	(76)	(11)	(19)	(27)	(9)	(6)	(271)
C	Montréal	117906	73067	677489	329841	2502804	975350	608167	1119701	216951	343225	187154	29174	80780	7262031
		(25)	(11)	(57)	(44)	(145)	(72)	(61)	(117)	(22)	(45)	(27)	(7)	(9)	(652)
O	Outaouais	10172	4497	-	-	3512	15852	776521	115001	4886	166216	1975	-	5305	1103587
		(5)	(2)	-	-	(2)	(7)	(139)	(22)	(2)	(50)	(2)	-	(2)	(246)
R	Abit.-Tem.	1785	2019	-	-	685	468	12528	615	4432	582388	6766	213	67701	680100
		(4)	(2)	-	-	(2)	(1)	(16)	(2)	(2)	(249)	(4)	(1)	(55)	(240)
I	C-Nord-Qu.-M.	9776	8832	164	-	-	-	-	96	7557	8515	267789	189787	4496	497805
		(14)	(8)	(1)	-	-	-	-	(1)	(6)	(4)	(127)	(113)	(2)	(277)
G	Newfoundland	-	-	-	-	-	-	-	-	-	-	-	188	182	370
		-	-	-	-	-	-	-	-	-	-	-	(1)	(1)	(2)
I	P.-E.-I.	50	47	-	-	-	-	-	-	-	-	-	-	-	97
		(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	(2)
N	Nova-Scotia	69	57	-	-	-	-	-	-	-	-	-	361	350	1197
	C	(1)	(1)	-	-	-	-	283	-	-	166	-	(1)	(1)	(6)
S	A Nov.-Brunswick	500	482	162	73	254	102	(1)	-	-	(1)	-	492	477	2350
	H	(3)	(2)	(1)	(1)	(1)	(1)	-	-	-	-	-	(2)	(1)	(14)
	A Ontario	1887	1695	10394	4688	16205	6495	153827	5673	4176	125762	6441	10089	9781	357897
	D	(11)	(8)	(16)	(6)	(7)	(4)	(116)	(10)	(8)	(201)	(10)	(27)	(17)	(456)
	A Manitoba	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Brt.-Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	97	72	-	111	-	-	280
		-	-	-	-	-	-	-	(1)	(1)	-	(1)	-	-	(3)
	East	3469	2291	6141	2770	9623	3840	43581	5356	3143	35620	6081	25626	24845	174194
U		(20)	(15)	(14)	(5)	(7)	(3)	(51)	(11)	(5)	(87)	(19)	(75)	(48)	(372)
S	Center	189	188	452	204	708	283	20831	1698	1250	17031	1928	4444	4388	53505
A		(2)	(1)	(2)	(1)	(1)	(1)	(21)	(3)	(2)	(37)	(5)	(15)	(10)	(105)
	West	105	109	50	41	142	57	471	115	84	285	130	825	860	2246
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(15)
	Total Days (Total resp.)	845035 (244)	801650 (193)	1630955 (371)	725650 (127)	2555426 (179)	1019756 (100)	1657062 (417)	1627432 (284)	1198165 (229)	1254736 (218)	1847897 (488)	315530 (275)	305913 (176)	15895292 (76283)

Source: 1985 survey of fishers

In New Brunswick, the St John River region accounts for the highest number of fishing days (489,843 of a total of 1,426,389, or 34 per cent), followed by the Mirimichi River region (302,393, or 21 per cent of the total).

In Prince Edward Island, there are 51,121 fishing days in the Charlottetown area, which makes it the most congested region (26 per cent of the total).

In Nova Scotia, the largest number of fishing days are in the counties of Halifax and Cape Breton, with 224,395 days (21 per cent) and 122,983 days (12 per cent) respectively.

Finally, in Newfoundland, the most congested region is the Avalon Peninsula (St John's) with 761,214 fishing days (38 per cent of the total).

The program is easy to use and the code is backed up by data in order to facilitate its adaptation to similar surveys. It processes 3,000 questionnaires in six minutes and three seconds on a 10 MHz AT.

1.4.2 Calculation of the duration of fishing trips by non-resident anglers

With respect to the average duration of outings, which is the critical factor in the calculation of the number of visits, the data provided by Fisheries and Oceans Canada was incomplete. We had no data for resident anglers from any province except Quebec. Consequently, we had to develop an alternative scenario for the other provinces.

We conducted several tests in order to find a scenario which represents the actual situation as accurately as possible. If possible, the margin of error had to be negative in order to underestimate the number of visits and provide conservative results.

First, we replaced all lacking values for duration with a default value of 1. Unfortunately, the disadvantage of this procedure was that it grossly overestimated surpluses. By arbitrarily assigning resident anglers an average minimum outing duration of 1, we maximized the number of visits (fishing days/average duration) for these provinces. The economic value of fishing in these provinces was therefore over-estimated. Based on this scenario, the estimated economic value for 1988 totaled $2,675,836,824 for Eastern Canada.

A second test was conducted by calculating the average number of fishing days for non-resident anglers for each region. These values were then used for resident anglers from the same region. Unfortunately, this reasoning introduced a major bias. It was clear that in a given fishing region, the duration of outings for residents of the province could not be compared to those of non-residents. Having to travel further to reach the fishing site, non-resident anglers tended to plan longer trips than resident anglers. As a result, using this scenario, the average duration for residents was overestimated and the number of visits

and economic values was underestimated. In addition, the current economic value of fishing in Eastern Canada was estimated to be only $1,472,000,000.

We attempted to develop an intermediate scenario by combining the two preceding models. For the origin zone and all neighbouring zones, we took an average default value of 1 day per outing. Anglers from other regions of the same province were considered non-residents and assigned an outing duration equal to the average duration of anglers from other provinces. Unfortunately, an examination of the results of the survey on fishing days revealed that most anglers were concentrated in origin zones and neighbouring zones, to which we assigned a average minimum duration of 1. As a result, the number of visits was once again maximized. Therefore, the economic value of the fishery in Eastern Canada, which, based on this scenario is currently $2,639,293,456, was still overestimated.

Finally, we developed a reasonably realistic scenario by calculating the average value of outings for residents of Quebec (1.24) and introducing this number for the residents in each region of each province. The main advantage of this model is that we can get rid of the average duration of outings of non-residents, a factor which is cumbersome because it is relatively independent of the duration of outings of residents. Based on this scenario, the economic value of fishing is $2,335,623,621.

It remains to be seen whether it was realistic to use the Quebec average for the other provinces. With respect to Ontario, we observed that the distances within Quebec and Ontario are comparable. Average duration varies on the basis of distance.

With respect to the Maritimes, the distances are generally shorter. As a result, the average duration of an outing in Quebec would be too long if applied to these provinces and the resulting economic value would therefore be underestimated. Therefore, even if these results were not exact, they were conservative, which is in keeping with the starting assumption . This last model was therefore used. The detailed results of economic values by fishing region was obtained using other scenarios provided in the appendix.

It would be preferable for the next survey conducted on the subject to provide more complete data on the number of visits per angler and the duration and destination of each outing in the same format for all provinces. This would considerably reduce the risk of bias.

1.4.3 Establishment of time and travel costs estimates

The travel cost data contained in the survey cannot be used for two reasons: first, the survey provides only an annual total, and there is no basis for calculating a "per trip" figure when more than one outing is reported by the respondent. Second, there are many zero values, which indicates that the respondents' may not have taken the cost of using their own car into account. Moreover, travel costs may have been indicated in other expense categories by respondents who purchased organized fishing expeditions. This situation did not come as a surprise since it is typical of this type of origin/destination survey.

The authors of this report calculated travel costs by conducting a detailed survey of travel routes between population centres (residence zones) and fishing regions. We defined 56 population centres and 64 fishing zones to conduct this analysis and to ensure that they obtained significant travel data even when residence and fishing zones were almost identical. With the exception of Quebec, Prince Edward Island and New Brunswick, the fishing zones and the residence zones of resident anglers overlap. For non-resident anglers, the entire province of origin is considered the residence zone. The same classification was used for resident anglers from New Brunswick and Prince Edward Island, for which the precise residence zone is unknown. For Quebec, the survey provided for only nine residence zones, which encompass the 13 fishing zones.

To produce a realistic approximation of travel cost, we took the following four factors into consideration:

- the time spent travelling, calculated by assuming a speed of 100 km/h on highways, 90 km/h on main roads, 80 km/h on secondary roads and 50 km/h on forest roads and county roads. Based on Cesario's findings, the hourly value of travel time was estimated to be 25 per cent of the average hourly wage, as reported in the survey on average income per residence zone in Appendix 2.

- the distance travelled. The costs of gas and vehicle depreciation were evaluated at 18 cents per kilometre. The value thereby obtained was then divided by 3, the average number of passengers per car.

- possible airfare.

- possibly ferry costs, evaluated at $12 per hour on board the ferry. These costs were divided among an average of four persons.

The sum of the values of these four factors was multiplied by 2 (round trip) to obtain the total cost.

CHAPTER 2

DEVELOPMENT OF A BIOLOGICAL PRODUCTIVITY INDEX

Generally, the most biologically productive regions will attract the largest number of anglers, since on average they will catch more fish per given effort, all other things being equal. Since acidity has an impact on biological productivity, a suitable indicator should take this factor into consideration and should be provided for each of the fishing regions used in the analysis.

2.1 Measurement of acidity levels in fishing regions in Eastern Canada

The acidity or alkalinity of a solution is measured by its pH. Data on the pH of waters in Eastern Canada were provided to us the Department of Fisheries and Oceans.

Table 4 illustrates these data. The most acid zones have the smallest pH values. The BUE (biomass per unit of catch effort) is an indicator of biological productivity and is explained below. The Maritime provinces exhibit the highest levels of acidity, particularly Nova Scotia.

2.2 Development of a biological productivity index

Biologists have conducted many studies on the relationship between pH and biological productivity. These studies show that the effect of pH varies significantly from species to species and that it also depends on other environmental factors, such as the presence of other substances in the water which may increase or decrease the effect of acidity.

It is generally recognized that acidification reduces the overall biological productivity of all freshwater ecosystems. This fact is supported by the observed reduction in fish populations and diversity in highly acidified lakes.

However, such a measure is too approximate to be applied to the majority of situations in which acidification has not yet reached almost toxic levels. What we need to do is to establish a relationship between pH and the abundance of fish in a body of water as perceived by anglers on the basis of the size of their catches. This question was studied by LOGIMER in the study on acidification of waters in Quebec conducted by Michaud in 1987 (see Appendix 6).

TABLE 4: pH and average BUE per fishing region

Fishing days	Initial BUE	Current BUE	BUE base 1980	BUE Canada	BUE Can+US	BUE plus 10%	Current pH
Quebec							
A	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
B	2396.4	2045.77	1828.45	1902.86	1989.93	1766.4	6.17
C	2500.11	2392.27	2349.21	2400.11	2447.91	2329.27	6.59
D	2500.11	2392.08	2349.21	2400.11	2447.91	2329.27	6.59
E	2500.11	2392.08	2349.21	2400.11	2447.91	2329.27	6.59
F	2494.61	2372.04	2269.94	2128.75	2382.45	2249.64	6.55
R	2485.46	2316.27	2064.4	2223.18	2316	1983.21	6.46
H	2443.29	2285.85	2003.02	2128.75	2217	1947.53	6.42
I	2415.99	2191.32	2026.34	2118.34	2199.05	1964.13	6.30
J	2462.37	2306.82	2177.15	2260.53	2341.49	2138.08	6.45
K	2358.73	2106.08	1837.51	1965.49	1977.39	1790.63	6.22
L	2297.7	2021.15	1897.55	1971.33	2044.74	1848.49	6.15
M	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
Ontario							
1	2551.92	2548.56	2540.82	2543.63	2546.73	2539.46	7.07
2	2563.86	2559.87	2554.66	2555.71	2557.46	2553.86	7.13
3	2572.49	2558.85	2546.1	2551.21	2557.24	2542.11	7.13
4	2466.15	1832.58	1833.83	2005.7	2119.36	1738.67	6.01
5	2449.93	2197.21	1205.78	1508.43	1773.98	1132.9	6.31
6	2529.53	2449.26	2011.23	2080.37	2142.39	1990.65	6.71
7	2465.22	2217.39	1295.3	1574.07	1763.16	1239.44	6.33
8	2459.5	2182.97	1249.89	1563.88	1769.73	1190.33	6.30
NB							
1	2345.41	1752.07	1424.77	1475.85	1565.25	1386.55	5.96
2	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
3	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
4	2345.41	1752.07	1424.77	1475.85	1565.25	1386.55	5.96
5	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
6	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
7	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
8	2345.41	1752.07	1424.77	1475.85	1565.25	1386.55	5.96
9	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
10	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
11	2352.14	1752.07	1640.01	1679.34	1802.55	1626.3	5.96
13	2345.41	1752.07	1424.77	1475.85	1565.25	1386.55	5.96

TABLE 4: pH and average BUE per fishing region

Fishing days	Initial BUE	Current BUE	BUE base 1980	BUE Canada	BUE Can+US	BUE plus 10%	Current pH
PEI							
1	2301.71	1517.01	1528.77	1636.09	1828.6	1440.64	5.83
2	2301.71	1517.01	1528.77	1636.09	1828.6	1440.64	5.83
3	2301.71	1517.01	1528.77	1636.09	1828.6	1440.64	5.83
4	2301.71	1517.01	1528.77	1636.09	1828.6	1440.64	5.83
5	2301.71	1517.01	1528.77	1636.09	1828.6	1440.64	5.83
6	2301.71	1517.01	1528.77	1636.09	1828.6	1440.64	5.83
NS							
1	1895.58	183.11	768.12	799.03	1008.32	746.75	5.14
2	2180.15	1062.11	1287.66	1434.08	1685.38	1153.34	5.61
3	2180.15	1062.11	1287.66	1434.08	1685.38	1153.34	5.61
4	2180.15	1062.11	1287.66	1434.08	1685.38	1153.34	5.61
5	2215.72	1172.07	1352.6	1513.46	1770.02	1204.17	5.66
6	2251.29	1281.95	1417.54	1592.84	1854.65	1254.99	5.71
7	2251.29	1281.95	1417.54	1592.84	1854.65	1254.99	5.71
8	2251.29	1281.95	1417.54	1592.84	1854.65	1254.99	5.71
9	2215.72	1172.07	1352.6	1513.46	1770.02	1204.17	5.66
10	2251.29	1281.95	1650.99	1769.62	1853.65	1599.16	5.71
11	2251.29	1281.95	1650.99	1769.62	1853.65	1599.16	5.71
12	2251.29	1281.95	1650.99	1769.62	1853.65	1599.16	5.71
13	2251.29	1281.95	1650.99	1769.62	1853.65	1599.16	5.71
14	1931.15	292.99	856.41	896.09	1092.85	831.99	5.22
15	1895.58	183.11	768.12	799.03	1008.32	746.75	5.14
16	1895.58	183.11	768.12	799.03	1008.32	746.75	5.14
17	1895.58	183.11	768.12	799.03	1008.32	746.75	5.14
18	1895.58	183.11	768.12	799.03	1008.32	746.75	5.14
Newfoundland							
1	2251.15	2059.49	1950.73	1986.28	2012.24	1938.07	6.18
2	2339.99	2229.45	2076.62	2089.74	2096.39	2072.29	6.35
3	2339.99	2229.45	2076.62	2089.74	2096.39	2072.29	6.35
4	2251.15	2059.49	1950.73	1986.28	2012.24	1938.07	6.18
5	2263.35	2036.67	1907.63	1950.07	2034.04	1876.53	6.16
6	2251.15	2059.49	1950.73	1986.28	2012.24	1938.07	6.18

In a 1986 study of 17 lakes in the Temiscamingue region, Frenette established a significant empirical relationship between the pH and the weight of a fish caught with nets and traps, expressed as follows: "Biomass per Unit of Catch Effort (BUE):

$$\log(BUE) = 3.42 - 0.16\,[H+]$$

$$[H+] = 10^{(6-pH)}$$

where: BUE = Biomass in grams per unit of effort

H+ = Concentration of hydrogen ions

Frenette confirmed his results in a more recent study on 36 lakes in the Temiscamingue region. The acidity of the water appears to be the single most important factor in explaining the biological productivity of the lakes.

This type of productivity indicator is well suited to the needs of this study because it describes the probability of success of catches and can be used for a single lake or for an entire region, by calculating a weighted average per lake zone.

Table 4 illustrates the results of the application of this method to all fishing regions in Eastern Canada for all types of BUE. Beginning with current BUE, five acidification scenarios, provided by the Department, were applied using the travel cost method. The five scenarios are as follows:

- **CURRENT** scenario: This scenario represents current BUE values, obtained by analyzing water samples taken in each fishing region.

On the basis of this empirical scenario, five hypothetical scenarios were developed:

- **INITIAL** scenario: This scenario represents the average BUE for each region before the process of acidification begins. The pH and BUE values are higher than those of the current scenario, since the degradation of the bodies of water by acidification has not yet begun.

- **STATUS QUO** scenario: Under this scenario, acid emissions that cause acid rain will remain constant in future years. Neither Canada nor the United States will take initiatives to check degradation of their fisheries. Therefore, lakes and rivers will continue to deteriorate at the same rate as today until the process of acidification reaches a steady state. The experts feel that this would occur in about twelve years. The BUEs provided for this scenario in Table 4 correspond to this stabilized pH value.

- **CANADA** scenario: This scenario will apply if Canada adopts measures to control the effects of acid rain. Acid emissions from Canadian industry are responsible for 50 per cent of the acidification of lakes and rivers in our regions. Effective monitoring of environmental protection measures taken by Canadian companies would translate into a 42 per cent reduction in Canadian emissions (emissions produced in Canada). As a result, this scenario would generate a 21 per cent reduction in pollution caused by acid deposition in Eastern Canada.

- **CAN + US** scenario: This scenario is based on the hypothesis that joint measures would be taken by Canada and the United States to control the acidification of our lakes and rivers. Acid emissions from US industries, particularly blast furnaces in the Great Lakes region, are responsible for 50 per cent of the acidification of waters in Eastern Canada. In light of the present situation, co-operation between Canada and the US in this area would clearly be an ideal solution. Vigilant control of acid emissions from both sides of the border would result in a 42 per cent reduction of emissions in North America and would therefore substantially increase the steady state of pH. The effect of this increase on biological productivity for fishing would be considerable.

- **+10%** scenario: This scenario is based on the most pessimistic hypothesis: not only would neither Canada nor the United States take no steps to resolve the ecological problem of acid rain, but in addition, industrial acid emissions would increase on both sides of the border by 10 per cent. The pH levels of our lakes would therefore stabilize at levels lower than those of the other scenarios.

CHAPTER 3

MODEL OF THE DEMAND FOR RECREATIONAL FISHING IN Eastern CANADA

By altering the biological potential of fishing areas, acidification reduces their attractiveness for recreational purposes. This leads to a decline in the number of visits and economic benefits associated with fishing. To simulate this phenomenon, a mathematical model of the behaviour of anglers had to be developed.

3.1 Theoretical basis of the model

The number of fishing days at a recreational site is determined primarily by three groups of factors:

- the demographic characteristics of the origin of residence zones, i.e. the population;
- the distance between the residence zones and the recreation sites, measured in travel cost;
- the quality of the recreation experience offered by the site, i.e. its biomass per unit of effort.

In mathematical terms, the number of visits to recreational site "i" having as its origin population region "j" is expressed as follows:

$$DAYS_{i,j} = f[POP_j, ACCESS_{i,j}, BUE_i]$$

where $DAYS_{i,j}$ = number of fishing days of residents from region j at site i

POP_j = number of residents in region j

$ACCESS_{i,j}$ = travel cost

BUE_i = indicator of biological productivity

3.2 Econometric estimation of the model

The quantitative estimation of demand functions can be done by applying econometric modelling methods to a suitable sample.

3.2.1 Sample

The origin/destination matrices provide data on the number of days spent fishing. However, because of the limitations of the survey, some of the estimated values are based on a very small number of questionnaires. Therefore, it is possible that the margin of error of these particular O/D pairs is too large. In several cases, particularly in the Maritime provinces, data come from only 1 or 2 questionnaires.

There are 682 observations of total fishing days for all species. When the analysis is restricted to a particular species, the number of O/D pairs drops considerably. Although it may seem desirable to distinguish between the various types of fish, such a distinction is hardly possible owing to the size of the survey available. Moreover, a more disaggregated approach does not automatically guarantee more accurate results. Econometric demand models used in policy applications generally cover broad categories. This does not hinder their ability to provide valuable information to decision-makers, however.

The use of a more extensive survey would undoubtedly allow more refined econometric studies. However, our sole concern here was to determine whether it is possible to develop an operational model of fishing demand from the existing data, an issue which is addressed in the next section.

3.2.2 Functional form of the demand equation

The spatial phenomena of demand are generally represented by a mathematical form known as a "gravity model" because of its similarity with the law of gravity. In this case, the form of the equation is as follows:

$$DAYS = a1*POP^{a2}*ACCESS^{a3}*BUE^{a4}$$

In order to adjust this model to represent the behaviour of consumers of a specific product, the coefficients a1, a2, a3 and a4 must be estimated.

3.2.3 Econometric estimation of the demand equation

In order to be able to use multiple linear regression estimation techniques, the above model must be transformed into a linear equation. This is done by taking the logarithm of both sides of the equation:

$$\ln[FISHING\ DAYS] = a1 + a2*\ln[POP] + a3*\ln[ACCESS] + a4*\ln[BUE]$$

This transformation enables us to use ordinary least squares for estimating the parameters, but it also creates a number of problems. The use of logarithms is not consistent with the required assumption underlying the least squares method that errors relating to visit estimates must be normally distributed and must have the same standard deviation.

These problems are often disregarded in modelling work, but in this particular case, it must be resolved because it is compounded by the fact that the margin of error is larger for smaller O/D fishing day values since these figures are based on a smaller number of questionnaires at the outset.

To overcome this problem, a technique known as "weighted least squares" can be used. First, all variables in the sample are multiplied by a variable which will compensate for the undesirable error patterns. Previous studies (Michaud, 1983) have shown that multiplying all variables in the sample by the absolute value of visits eliminates problems caused by variable sample base and the logarithmic transformation. In a similar study conducted in Ontario, Victor and Burrell (1983) used the square root of the number of respondents. In a study on the acidification of bodies of water in Quebec conducted by Michaud in 1987, a square root weighting of the number of fishing days proved the most effective, because it is closely related to the margins of error of estimations of fishing days by O/D pair.

In view of the methodological similarity of the two studies, this method of weighting has also been used for this study.

3.3 Analysis of the regression results

On the basis of the available data, it is possible to establish a number of variations of the model just described. For instance, we could calculate a general equation or an equation for each province. We could also use "secondary variables". This technique, which can improve the capacity of the model to describe reality, includes "dummy variables" in order to represent particular attributes of fishing destinations other than their biological productivity, such as scenic quality or congestion. A dummy variable for a given province takes the value 1 when that province is the destination, and the value 0 if it is not.

Table 5 provides the empirical results obtained using alternative forms. Equations providing an adjusted R^2 of less than 0.4 were excluded.

The regression results show that the model does not always provide a very accurate representation of fishing demand, particularly with equations that have unweighted secondary variables. The inclusion of a secondary variable to specify the US origins also has a negative impact on the accuracy of the model. Therefore, there are no characteristics peculiar to US anglers which could have a determining effect on the model.

According to the adjusted R^2 test, the most realistic variation is clearly the equation by province with weighted secondary variables (variation 1 in Table 5). The coefficients of the key variable (BUE) are very significant, with respective Student's test values of 26.1, 25.1 and 12.5. The adjusted R^2 is reasonable (0.67). However, the model is much less accurate than that proposed in the similar study on Quebec published by Michaud in 1987. This is due to the greater deviations among fishing days per O/D pair in the six provinces which considerably increased errors between the real relationship and the regression equation.

TABLE 5: REGRESSION RESULTS

Province	Constant	Log(pop)	Log(cost)	Log(BUE)	Dummy variables						R^2	Adjusted R^2
					Quebec	Ontario	NB	PEI	NS	USA		
Variation 1												0.678954
Quebec	-271.903	0.114985	-0.49683	1.798613							0.996944	
		(3.147697)	(-9.14064)	(26.11772)								
Ontario	-429.819	0.424821	-1.1721	1.713798							0.99772	
		(8.435838)	(-11.8677)	(25.07209)								
Maritimes	-119.317	0.612889	-0.26046	0.819437			-1.169718	-1.40779	-0.02421		0.991648	
		(13.42440)	(-4.41164)	(12.47251)			(-6.68349)	(-5.19871)	(-0.14758)			
Variation 2												0.498562
Quebec	-271.903	0.114985	-0.49683	1.798613							0.996944	
		(3.147697)	(-9.14064)	(26.11772)								
Ontario	-429.819	0.424821	-1.1721	0.068865							0.99772	
		(8.435838)	(-11.8677)	(25.07209)								
New Brunswick	-105.043	-0.1329	-0.57885	2.174146							0.995747	
		(-0.87241)	(-3.68282)	(8.634239)								
PEI	-36.8552	-0.31691	-0.36054	2.086632							0.99901	
		(-3.18934)	(-3.12090)	(14.67685)								
Nova Scotia	-86.1787	0.980457	-0.5565	0.243579							0.989635	
		(20.86796)	(-4.89322)	(4.297698)								
Newfoundland	-162.113	0.334351	-0.27308	1.275428							0.995022	
		(2.905904)	(3.01297)	(6.651144)								
Variation 3												0.492048
Eastern Canada	-186.198	0.359132	-0.75825	1.572714	-178.53	-179.042	-57.5322	33.38008	70.47199		0.994899	
		(15.08764)	(-16.8587)	(41.42142)	(-4.95969)	(-4.28080)	(1.25108)	(0.675230)	(1.997592)			
Variation 4												0.613286
Eastern Canada	-178.409	0.296896	-0.89753	1.674149	-0.26902	0.857941	-0.73021	-1.73819	0.358124		0.995797	
		(12.65999)	(-22.041)	(45.15667)	(-1.38707)	(4.400167)	(-2.70954)	(-3.04599)	(1.228860)			
Variation 5												0.6484
Eastern Canada	-181.769	0.3987	-0.70113	1.413927	-0.36103	0.75443	-0.83435	-1.53856	0.332596	-1.36425	0.996121	
		(15.15276)	(-14.8663)	(28.36464)	(-1.93213)	(4.013991)	(-3.21584)	(-2.80132)	(1.158566)	(-7.46662)		

System 1 is selected.

CHAPTER 4

ECONOMIC BENEFITS OF RECREATIONAL FISHING

4.1 Demand curve for recreational fishing in each region

The first step in estimating the demand curve for recreational fishing in each zone consists in estimating the demand curve for the whole recreational experience, which is, for all practical purposes, the relationship between travel cost and the number of visits (Clawson and Knetsch, 1966).

The development of the demand curve for the recreation experience was based on data contained in the O/D tables found in Appendix 3.

The source of data on population and average annual income (per household) in the residence zones is the 1981 census by Statistics Canada. We added the data on population and income of all census divisions forming each residence zone. A correction factor was then calculated in order to adjust the 1981 values to 1985 conditions. The calculation for each zone is provided in Appendix 2. The hourly wage, required for the calculation of travel cost, was obtained by dividing the annual average income by 2,000. The source of data for residence zones located in the United States was the US Department of Commerce, 1987.

The data on number of fishing days and average duration of each outing were taken from the 1985 Survey on Sport Fishing in Canada, published by Fisheries and Oceans Canada. We then obtained the number of visits for each O/D pair by dividing the number of fishing days by the average duration of outings. By dividing the number of visits by the total population of the residence zone (*1,000), we obtained the visit rate per thousand residents.

On the basis of these data, we estimated the demand curve for the recreation experience of each region. This was obtained by adjusting a least squares regression line to the relationship between the logarithm of the visit rate and the total travel cost of a round trip. Figure 4 illustrates the relationship obtained for region A of Quebec with the current scenario.

Table 6 provides the intercept, the slope and R^2 for each of the regions of Quebec.

On the basis of these curves, we estimated the effect of an increase in entrance fees in each region. The calculations were done in order to obtain the number of visits associated with the fee increases for each region.

FIGURE 4

DEMAND FOR THE RECREATION EXPERIENCE
Quebec, Region A, Present BUE

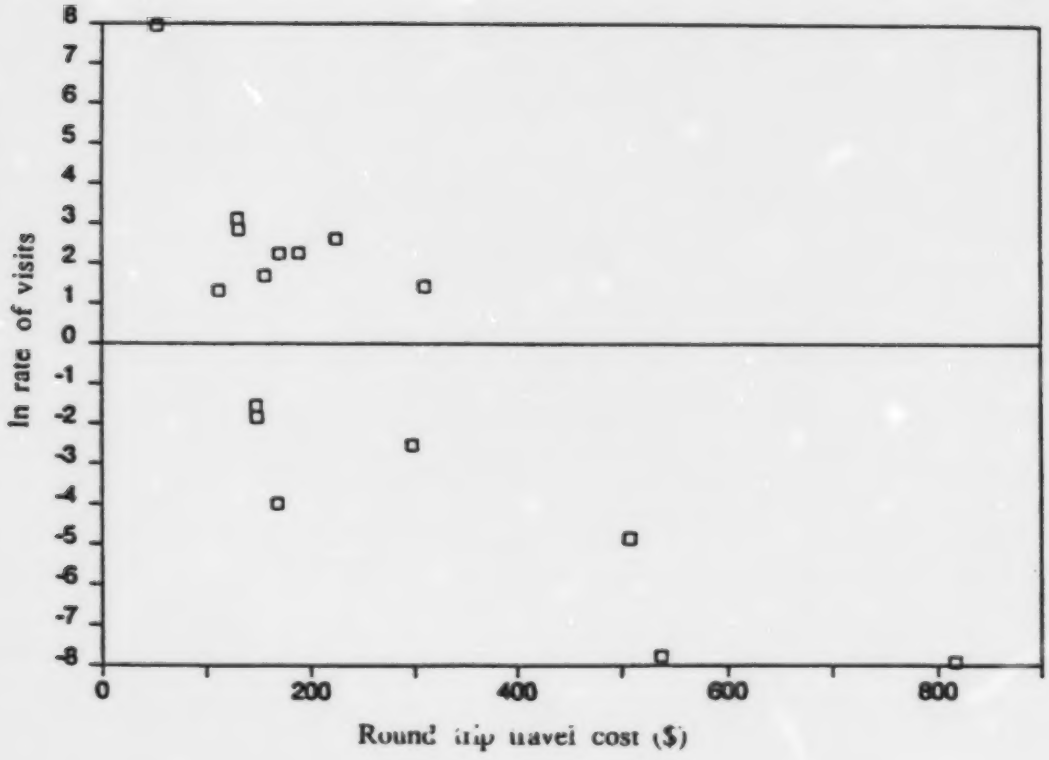


TABLE 6: DEMAND EQUATION FOR THE RECREATION EXPERIENCE PROVINCE OF QUEBEC - PRESENT BUE

REGION	Number of observations N	Intercept a	Slope b	R^2
A	16	4.012	-0.017	0.628
B	16	3.71	-0.021	0.710
C	11	4.091	-0.023	0.778
D	10	2.892	-0.021	0.743
E	11	2.406	-0.019	0.755
F	11	2.524	-0.018	0.728
G	11	4.899	-0.020	0.855
H	14	4.172	-0.020	0.767
I	14	4.509	-0.020	0.805
J	14	5.513	-0.017	0.814
K	14	5.646	-0.020	0.814
L	14	3.854	-0.007	0.480
M	16	1.279	-0.003	0.124

$\ln y = a + bx$
y = visits/1,000 residents
x = round trip travel cost

This procedure implies doubling the cost of each visit from $5 to $10 per trip for a group that initially exhibited a visit rate of 200 visits per 1,000 population would lower the visit rate to that of another group who's initial cost per trip was $10 (Clawson and Knetsch, 1966).

Table 7 shows the detailed calculations obtained for region A of Quebec (Gaspé). We can see from this table that the total number of visits from the Montreal region is 28,207 when there is no entrance fee, dropping to 25,918 when there is an entrance fee of $10. Therefore, using the demand equation for the recreation experience, we can calculate the number of visits for each entrance fee. We simply add this entrance fee to the total travel cost and include this amount in the calculation of the number of visits.

The demand curve for recreational fishing in each region is obtained by finding, by regression, the equation relating entrance fees to the logarithm of total visits per year. Figure 5 shows the relation obtained for the Gaspé (region A, Quebec) with the current BUE. Table 8 shows the results for each of the fishing regions of Quebec with the current BUE.

FIGURE 5
DEMAND FOR RECREATIONAL FISHING
Quebec, Region A, Current BUE

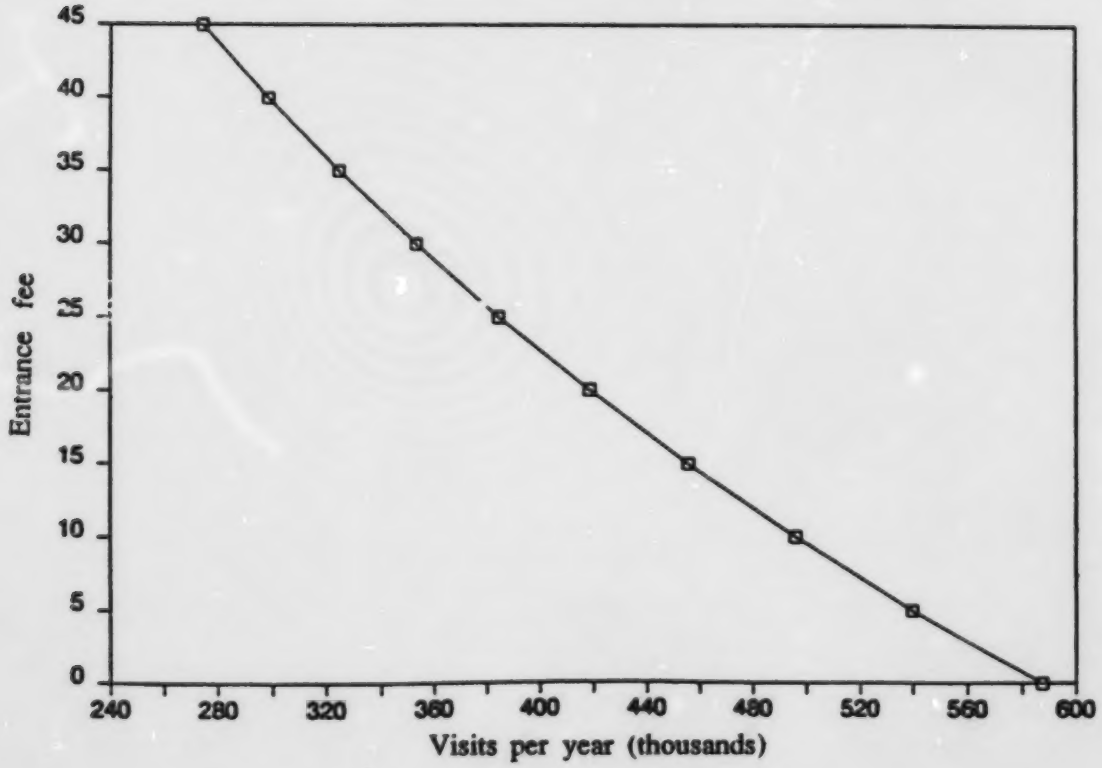


TABLE 7: INCREASE IN ENTRANCE FEES
Province of Quebec, Region A, Present BUE

Origins	Real visits	Simulated visits at $0.00	Simulated visits at $5.00	Simulated visits at $10.00	Simulated visits at $15.00	Simulated visits at $20.00	Simulated visits at $25.00	Simulated visits at $30.00	Simulated visits at $35.00	Simulated visits at $40.00	Simulated visits at $45.00
Gaspé	532547	532547	489333	449626	413141	379616	348812	320508	294500	270603	248644
Saguenay	1191	1191	1094	1005	924	849	780	717	659	605	556
Quebec City	14288	14288	13129	12064	11085	10185	9359	8599	7902	7260	6671
Trois-Rivières	1926	1926	1769	1626	1494	1373	1261	1159	1065	979	899
Eastern Townships	1772	1772	1628	1496	1374	1263	1160	1066	980	900	827
Montreal	28207	28207	25918	23815	21883	20107	18475	16976	15599	14333	13170
Outaouais	3001	3001	2757	2533	2328	2139	1965	1806	1659	1525	1401
Abitibi-Temiscamingue	490	490	451	414	380	350	321	295	271	249	229
N. Shore-Northern Que	2256	2256	2073	1905	1750	1608	1478	1358	1248	1147	1053
PEI	20	20	18	17	15	14	13	12	11	10	9
NS	16	16	15	14	13	12	11	10	9	8	8
NB	148	148	136	125	115	106	97	89	82	75	69
Ontario	729	729	670	616	566	520	478	439	403	371	341
Eastern USA	704	704	647	594	546	502	461	423	389	358	329
Central USA	42	42	38	35	32	30	27	25	23	21	19
Western USA	17	17	16	14	13	12	11	10	9	9	8
TOTAL	587354	587354	539693	495899	455659	418685	384710	353493	324808	298452	274234

TABLE 8: DEMAND CURVE FOR RECREATIONAL FISHING PROVINCE OF QUEBEC - CURRENT BUE

REGION	intercept a	Slope b
A	784.815	-59.082
B	637.400	-47.365
C	579.998	-43.244
D	615.631	-47.589
E	759.693	-51.548
F	750.853	-54.393
G	673.757	-48.825
H	658.826	-49.079
I	703.932	-51.175
J	775.487	-57.316
K	700.247	-49.443
L	1691.117	-137.265
M	3631.492	-338.771

N = 10 R^2 = 1.0
y = a + b lnx
y = entrance fee
x = visits per year

The area under the demand curve represents the consumer surplus. This value may be calculated by integrating the equation of the demand curve.
Since

$$\text{Entrance fee} = a + b * \ln \text{visits per year}$$

The consumer surplus is equal to:

$$\text{Consumer surplus} = a*\text{visits} + b(\text{visits}*\ln \text{visits} - \text{visits})$$

Table 9 shows the value of the consumer surplus for each fishing region of Eastern Canada and for each scenario.

TABLE 9: ESTIMATIONS OF THE CONSUMER SURPLUS WITH DIFFERENT SCENARIOS

	SURPLUS INITIAL SC	SURPLUS CURRENT SC	SURPLUS STATUS QUO SC	SURPLUS CANADA SC	SURPLUS CAN+US SC	SURPLUS +10% SC
QUEBEC						
A	58 941 644$	34 702 325$	30 812 679$	32 154 446$	36 521 283$	30 350 931$
B	43 998 004$	33 102 725$	27 048 221$	29 060 122$	31 495 333$	25 419 690$
C	31 274 858$	28 890 419$	27 961 840$	29 060 935$	30 110 187$	27 536 407$
D	21 390 422$	19 756 764$	19 124 485$	19 876 210$	20 593 845$	18 833 510$
E	140 348 397$	129 629 520$	125 480 968$	130 413 244$	135 121 843$	123 571 802$
F	58 883 854$	53 782 552$	49 690 592$	44 270 188$	54 207 825$	48 894 178$
G	54 544 971$	48 049 128$	39 062 790$	44 631 760$	48 039 054$	36 343 116$
H	37 392 595$	33 170 851$	26 156 750$	29 183 540$	31 395 497$	24 867 874$
I	57 430 486$	48 183 739$	41 856 159$	45 335 943$	48 489 881$	39 573 311$
J	48 449 712$	43 084 318$	38 826 517$	41 541 794$	44 255 955$	37 582 305$
K	85 770 859$	69 958 735$	54 737 234$	61 784 042$	62 458 474$	52 251 104$
L	38 750 602$	30 768 414$	27 467 146$	29 417 757$	31 417 332$	26 203 077$
M	26 027 442$	15 323 847$	13 606 258$	14 198 755$	16 127 062$	13 402 359$
SUBTOTAL	703 203 846$	588 403 335$	521 831 638$	550 928 737$	590 233 572$	504 829 666$
ONTARIO						
1	112 172 903$	111 919 906$	111 338 014$	111 549 123$	111 782 213$	111 235 900$
2	94 162 001$	93 911 002$	93 583 676$	93 649 605$	93 649 541$	93 533 457$
3	56 611 049$	56 097 598$	55 619 413$	55 810 858$	56 037 122$	55 470 120$
4	307 062 627$	184 595 662$	184 811 503$	215 480 299$	236 828 392$	168 681 881$
5	297 364 262$	246 749 789$	88 233 813$	129 513 204$	171 003 815$	79 292 370$
6	257 537 999$	243 691 101$	173 853 955$	184 221 854$	193 733 934$	170 816 308$
7	487 334 913$	406 414 799$	161 750 692$	225 904 795$	274 384 962$	149 980 822$
8	275 402 708$	224 489 008$	86 328 537$	126 753 844$	156 674 472$	79 398 866$
SUBTOTAL	1 887 648 460$	1 567 868 864$	955 519 604$	1 142 883 581$	1 294 094 449$	908 409 723$
NB						
1	34 513 880$	27 176 773$	22 940 716$	23 612 516$	24 778 323$	22 435 205$
2	20 299 351$	15 946 543$	15 105 832$	15 402 046$	16 322 062$	15 002 275$
3	5 157 387$	4 051 484$	3 837 887$	3 913 145$	4 146 891$	3 811 577$
4	2 345 332$	1 846 751$	1 558 897$	1 604 548$	1 683 769$	1 524 546$
5	1 891 308$	1 485 753$	1 407 423$	1 435 022$	1 520 740$	1 397 775$
6	1 954 554$	1 535 438$	1 454 488$	1 483 010$	1 571 595$	1 444 517$
7	3 387 308$	2 660 965$	2 520 677$	2 570 106$	2 723 627$	2 503 397$
8	5 099 648$	4 015 543$	3 389 638$	3 488 901$	3 661 157$	3 314 946$
9	3 035 010$	2 384 210$	2 258 513$	2 302 801$	2 440 355$	2 243 030$
10	3 206 966$	2 519 294$	2 386 475$	2 433 272$	2 578 620$	2 370 115$
11	2 845 287$	2 235 170$	2 117 330$	2 158 850$	2 287 805$	2 102 815$
13	29 288$	23 062$	19 467$	20 037$	21 026$	19 038$
SUBTOTAL	83 765 319$	65 880 986$	58 997 345$	60 424 253$	63 735 969$	58 169 236$
PEI						
1	1 137 125$	808 052$	813 181$	859 671$	941 717$	774 563$
2	2 312 213$	1 643 080$	1 653 510$	1 748 041$	1 914 872$	1 574 985$
3	1 411 526$	1 003 044$	1 009 411$	1 067 119$	1 168 964$	961 474$

TABLE 9: ESTIMATIONS OF THE CONSUMER SURPLUS WITH DIFFERENT SCENARIOS

	SURPLUS INITIAL SC	SURPLUS CURRENT SC	SURPLUS STATUS QUO SC	SURPLUS CANADA SC	SURPLUS CAN+US SC	SURPLUS +10% SC
4	2 575 670$	1 830 295$	1 841 914$	1 947 216$	2 133 056$	1 754 441$
5	3 680 354$	2 615 294$	2 631 896$	2 782 361$	3 047 907$	2 506 907$
6	1 595 525$	1 133 795$	1 140 993$	1 206 223$	1 321 344$	1 086 807$
SUBTOTAL	12 712 413$	9 033 561$	9 090 905$	9 610 630$	10 527 860$	8 659 176$
NOVA SCOTIA						
1	4 460 964$	657 167$	2 127 908$	2 197 825$	2 659 409$	2 079 273$
2	1 296 997$	719 474$	842 453$	920 180$	1 050 353$	769 734$
3	2 177 837$	1 208 096$	1 414 596$	1 545 109$	1 763 688$	1 292 490$
4	3 432 303$	1 903 976$	2 229 423$	2 435 114$	2 779 597$	2 036 983$
5	2 568 834$	1 524 444$	1 714 326$	1 879 677$	2 137 031$	1 558 572$
6	3 801 735$	2 396 514$	2 602 316$	2 863 214$	3 243 472$	2 355 136$
7	2 573 478$	1 622 253$	1 761 565$	1 938 172$	2 195 578$	1 594 243$
8	4 918 767$	3 100 662$	3 366 934$	3 704 488$	4 196 475$	3 047 126$
9	1 265 125$	750 773$	844 288$	925 722$	1 052 467$	767 581$
10	2 749 538$	1 733 237$	2 132 515$	2 257 285$	2 344 748$	2 077 499$
11	2 247 986$	1 417 071$	1 743 516$	1 845 526$	1 917 035$	1 698 536$
12	6 637 040$	4 183 816$	5 147 625$	5 448 803$	5 659 928$	5 014 823$
13	1 142 541$	720 228$	886 144$	937 991$	974 335$	863 283$
14	12 229 565$	2 608 088$	6 281 158$	6 518 654$	7 670 095$	6 134 012$
15	53 108 689$	7 823 704$	25 333 183$	26 165 558$	31 660 813$	24 754 178$
16	15 715 526$	2 315 132$	7 496 406$	7 742 716$	9 368 831$	7 325 071$
17	4 393 358$	647 207$	2 095 660$	2 164 517$	2 619 106$	2 047 762$
18	2 560 431$	377 190$	1 221 342$	1 261 472$	1 526 405$	1 193 428$
SUBTOTAL	127 280 713$	35 709 033$	69 241 359$	72 752 025$	84 819 366$	66 609 732$
NFLD						
1	19 501 651$	18 130 277$	17 341 891$	17 600 441$	17 788 716$	17 249 611$
2	9 610 467$	9 236 830$	8 714 670$	8 759 762$	8 782 597$	8 699 777$
3	3 434 630$	3 301 099$	3 11[illegible] 487$	3 130 602$	3 138 763$	3 109 164$
4	2[illegible] 934 9[illegible]0$	25 970 558$	24 841 240$	25 211 597$	25 481 27[illegible]$	24 709 055$
5	8 841 296$	8 108 868$	7 685 401$	7 825 230$	8 100 287$	7 582 577$
6	4 281 273$	3 980 210$	3 807 132$	3 863 893$	3 905 226$	3 786 874$
SUBTOTAL	73 604 287$	68 727 842$	65 504 820$	66 391 524$	67 196 879$	65 137 060$
TOTAL	2 [illegible]88 215 038$	2 335 623 621$	1 680 185 672$	1 902 990 751$	2 110 608 096$	1 61[illegible] 814 593$

4.2 Simulation of the effects of acidification on the economic value of recreational fishing

In this section, we have estimated the loss in consumer surplus caused by a decline in fishing quality caused by the acidification of lakes.

The model of the demand for recreational fishing (Chapter 3) was then used to simulate the effect of the decline in biological potential on the number of visits in each region. This gives us a number of simulated days for each O/D pair and each scenario (Table 10).

The loss in consumer surplus associated with the acidification of lakes in Eastern Canada was calculated by subtracting the value of the simulated surplus from the present consumer surplus and is illustrated in Figure 6.

The value of a fishing day was obtained by dividing the present consumer surplus by the total number of fishing days.

FIGURE 6 : CALCULATION OF THE LOSS IN CONSUMER SURPLUS

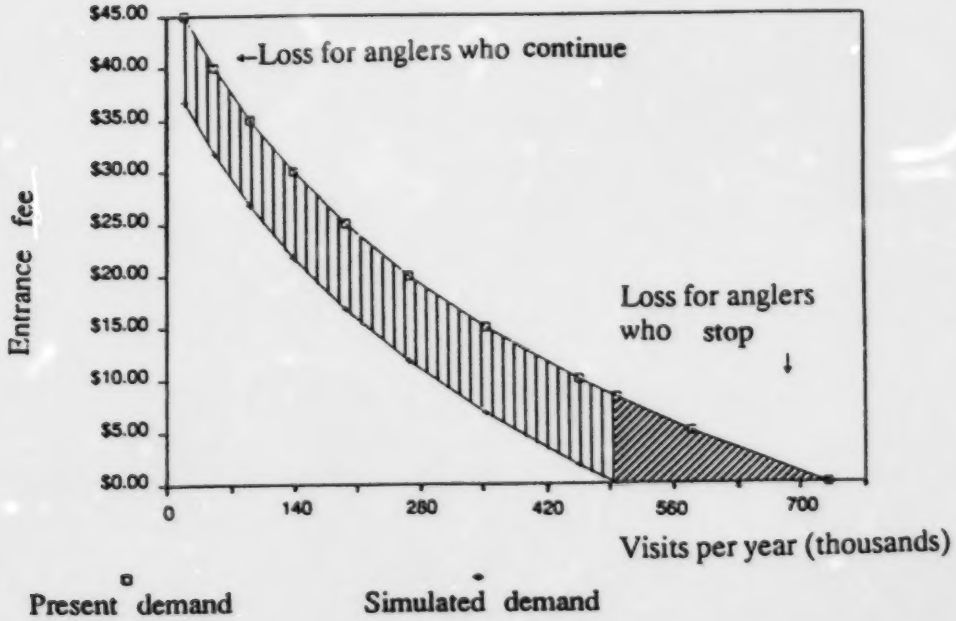


TABLE 10: NUMBER OF SIMULATED DAYS FOR EACH SCENARIO

	INITIAL SCENARIO	CURRENT SCENARIO	STATUS QUO SCENARIO	CANADA SCENARIO	CAN+US SCENARIO	+10% SCENARIO
QUEBEC						
A	1 435 289	845 037	750 320	782 994	889 330	739 076
B	1 065 557	801 692	655 062	703 787	762 764	615 622
C	1 765 564	1 630 955	1 578 534	1 640 581	1 699 815	1 554 517
D	796 532	735 698	712 153	740 146	766 869	701 318
E	2 766 730	2 555 426	2 473 644	2 570 876	2 663 698	2 436 008
F	1 116 478	1 019 754	942 168	839 393	1 027 817	927 067
G	1 881 082	1 657 061	1 347 151	1 539 207	1 656 714	1 253 358
H	1 834 560	1 627 432	1 283 305	1 431 806	1 540 329	1 220 070
I	1 428 099	1 198 164	1 040 819	1 127 349	1 205 777	984 052
J	1 523 446	1 354 737	1 220 855	1 306 234	1 391 578	1 181 733
K	2 265 559	1 847 896	1 445 834	1 631 969	1 649 783	1 380 165
L	397 389	315 531	281 676	301 680	322 186	268 713
M	519 589	305 912	271 624	283 452	321 947	267 553
SUBTOTAL	18 795 874	15 895 295	14 003 146	14 899 473	15 898 607	13 529 253
ONTARIO						
1	2 456 422	2 450 882	2 438 139	2 442 762	2 447 867	2 435 903
2	1 617 952	1 613 639	1 608 015	1 609 148	1 611 036	1 607 152
3	1 424 188	1 411 271	1 399 241	1 404 057	1 409 750	1 395 485
4	7 888 556	4 742 333	4 747 878	5 535 771	6 084 212	4 333 502
5	6 274 660	5 206 648	1 861 815	2 732 848	3 608 338	1 673 142
6	5 450 582	5 157 524	3 679 478	3 898 906	4 100 221	3 615 188
7	10 422 920	8 692 234	3 459 458	4 831 560	5 868 434	3 207 729
8	6 306 058	5 140 257	1 976 715	2 902 357	3 587 468	1 818 043
SUBTOTAL	41 841 339	34 414 788	21 170 739	25 357 409	28 717 325	20 086 144
NB						
1	622 089	489 843	413 491	425 600	446 613	404 379
2	384 935	302 393	286 431	292 068	309 514	284 487
3	81 062	65 [illegible]	60 323	61 306	65 180	59 [illegible]
4	53 422	42 065	35 508	36 548	38 353	34 726
5	53 042	41 668	39 471	40 245	42 649	39 201
6	75 053	58 959	55 851	56 946	60 347	55 468
7	151 747	119 208	112 923	115 138	122 015	112 149
8	137 624	108 367	91 476	94 155	98 803	89 460
9	104 391	82 006	77 683	79 206	83 937	77 150
10	54 516	42 826	40 568	41 364	43 834	40 290
11	94 806	74 477	70 551	71 934	76 231	70 067
13	1 139	897	757	779	818	740
SUBTOTAL	1 813 826	1 426 389	1 285 052	1 315 487	1 388 294	1 268 027
PEI						
1	40 816	29 004	29 188	30 857	33 802	27 802
2	36 044	25 613	25 776	27 249	29 850	24 552
3	42 798	30 413	30 606	32 356	35 444	29 153
4	49 237	34 988	35 210	37 223	40 776	33 538

TABLE 10: NUMBER OF SIMULATED DAYS FOR EACH SCENARIO

	INITIAL SCENARIO	CURRENT SCENARIO	STATUS QUO SCENARIO	CANADA SCENARIO	CAN+US SCENARIO	+10% SCENARIO
5	72 497	51 517	51 844	54 808	60 039	49 382
6	37 029	26 313	26 480	27 994	30 666	25 222
SUBTOTAL	278 420	197 848	199 104	210 487	230 575	189 648
NOVA SCOTIA						
1	155 137	22 854	74 001	76 433	92 485	72 310
2	51 743	28 703	33 609	36 710	41 903	30 708
3	73 545	40 797	47 770	52 178	52 178	43 647
4	102 491	56 854	66 572	72 714	72 714	60 826
5	86 638	51 414	57 818	63 395	63 395	52 565
6	97 580	61 512	66 794	73 491	73 491	60 450
7	67 712	42 684	46 350	50 996	50 996	41 947
8	106 583	67 187	72 957	80 271	80 271	66 027
9	30 952	18 368	20 656	22 648	22 648	18 779
10	65 928	41 559	51 133	54 124	54 124	49 814
11	74 857	47 188	58 059	61 455	61 455	56 561
12	190 338	122 984	147 624	156 261	156 261	143 816
13	31 161	19 643	24 168	25 582	25 582	23 545
14	388 172	82 782	199 367	206 905	206 905	194 697
15	1 523 226	224 394	726 589	750 462	750 462	709 982
16	451 312	66 485	215 279	222 352	222 352	210 358
17	163 120	24 030	77 809	80 366	80 366	76 031
18	93 880	13 830	44 782	46 253	46 253	43 758
SUBTOTAL	3 754 375	1 033 268	2 031 336	2 132 598	2 153 843	1 955 819
NFLD						
1	504 986	469 475	449 060	455 755	455 755	446 671
2	275 825	265 101	250 115	251 409	251 409	249 687
3	125 984	121 086	114 241	114 832	114 832	114 046
4	818 806	761 226	728 125	738 980	738 980	724 250
5	[illegible]	288 405	273 [illegible]	278 [illegible]	278 [illegible]	269 687
6	88 695	82 457	78 872	80 048	80 048	78 452
SUBTOTAL	2 128 750	1 987 751	1 893 756	1 919 341	1 919 341	1 882 793
TOTAL	68 612 583	54 955 339	40 583 133	45 834 796	50 307 986	38 911 684

4.3 Analysis of results

In 1985, a total of 54,955,339 fishing days were observed in Eastern Canada.

Using the travel cost technique to calculate the total annual economic value of recreational fishing for eastern Canada (in 1985) yielded an estimated $2,336 million. This averages to $42.50 per fishing day.

This value appears to be higher in provinces where acidification is less severe, such as Ontario ($45.56), and lower in highly acidified provinces (Nova Scotia with $34.56). This would seem to suggest the existence of a relationship between the level of fishing activity and the biological productivity of fishing sites.

At present, the acidification of water bodies and the resulting decline in the BUE has already lead to a substantial drop in the demand for recreational fishing in comparison to the situation before acidification: 13.6 million fishing days less. In 1988, this means a loss of $553 million (current dollars). Since this scenario provides data only on the past evolution of the phenomenon, it is of course impossible to conduct a discounted estimation of future losses.

If the acidification of fishing sites continues at the present rate (STATUS QUO scenario) this would cause a loss of an additional 14.3 million fishing days (26% drop from 1988) by the time the acidification reaches its steady state, corresponding to an annual loss of $655 million. In discounted 1988 dollars, the corresponding loss would total $4.4 billion over a period of 50 years at a discount rate of 10%.

However, if Canada takes measures to control acid emissions (CANADA scenario) this would cause, once the pH has stabilized, an additional loss of only 9.1 million fishing days (17% drop from 1988), which would translate into an annual loss of $433 million. In discounted 1988 dollars, the corresponding loss would total $2.9 billion. This means $1.5 billion (34%) less than the losses corresponding to the STATUS QUO scenario.

If we take the most optimistic hypothesis, that is joint action by the US and Canada would result in a loss of only $225 million a year. Demand would fall by 4.6 million fishing days. In discounted 1988 dollars, this represents a loss of $1.5 billion: $2.9 billion (66%) less than the losses corresponding to the STATUS QUO scenario.

However, it we adopt the opposite scenario, that is a 10 per cent increase in acid emissions in North America (+10% scenario), the acidification would intensify and damage to fish populations would increase. Annual demand would fall by 16 million fishing days (29% of the current total). The loss generated by this decline in anglers would be $724 million per year compared to the present situation. In discounted 1988 dollars, this means a loss of $4.8 million, $400 million more than the losses corresponding to the STATUS QUO scenario.

TABLE 11: ANNUAL DIFFERENCES IN CONSUMER SURPLUS BETWEEN TWO SCENARIOS

	DIFFERENCE INIT.-CUR.	DIFFERENCE CUR.-STAT.Q	DIFFERENCE CUR.-CAN	DIFFERENCE CUR.-CAN+US	DIFFERENCE CUR.-(+10%)	DIFFERENCE CAN-STAT.Q	DIFFERENCE CAN+US-STAT.Q	DIFFERENCE STAT.Q-(+10%)
QUEBEC								
A	24 239 319$	3 889 646$	2 547 879$	(1 818 958$)	4 351 394$	1 341 767$	5 708 603$	461 748$
B	10 895 278$	6 054 504$	4 042 604$	1 607 392$	7 683 036$	2 011 900$	4 447 112$	1 628 531$
C	2 384 439$	928 579$	(170 516$)	(1 219 767$)	1 354 012$	1 099 095$	2 148 347$	425 433$
D	1 633 658$	632 279$	(119 447$)	(837 082$)	923 253$	751 725$	1 469 360$	290 975$
E	10 718 877$	4 148 552$	(783 724$)	(5 492 323$)	6 057 718$	4 932 276$	9 640 875$	1 909 166$
F	5 101 302$	4 091 960$	9 512 364$	(425 273$)	4 888 374$	(5 420 404$)	4 517 233$	796 414$
G	6 495 843$	8 986 338$	3 417 367$	10 073$	11 706 012$	5 568 971$	8 976 265$	2 719 674$
H	4 221 745$	7 014 101$	3 987 310$	1 775 353$	8 302 976$	3 026 791$	5 238 748$	1 288 875$
I	9 246 748$	6 327 580$	2 847 796$	(306 142$)	8 610 427$	3 479 784$	6 633 722$	2 282 847$
J	5 365 394$	4 257 801$	1 542 523$	(1 171 637$)	5 502 013$	2 715 278$	5 429 438$	1 244 211$
K	15 812 125$	15 221 501$	8 174 693$	7 500 260$	17 707 630$	7 046 808$	7 721 241$	2 486 129$
L	7 982 189$	3 301 267$	1 350 657$	(648 918$)	4 565 336$	1 950 610$	3 950 185$	1 264 069$
M	10 703 595$	1 717 589$	1 125 092$	(803 215$)	1 921 488$	592 497$	2 520 804$	203 899$
SUBTOTAL	114 800 510$	66 571 697$	37 474 598$	(1 830 236$)	83 573 669$	29 097 099$	68 401 933$	17 001 972$
ONTARIO								
1	252 997$	581 891$	370 782$	137 693$	684 005$	211 109$	444 198$	102 114$
2	250 999$	327 326$	261 396$	261 461$	377 545$	65 929$	65 865$	50 219$
3	513 450$	478 185$	286 741$	60 477$	627 478$	191 444$	417 708$	149 293$
4	122 466 965$	(215 841$)	(30 884 637$)	(52 232 730$)	15 913 781$	30 668 796$	52 016 889$	16 120 622$
5	50 614 474$	158 515 976$	117 236 585$	75 745 974$	167 457 419$	41 279 390$	82 770 002$	8 941 443$
6	13 846 897$	69 837 146$	59 469 247$	49 957 167$	72 874 794$	10 367 899$	19 879 979$	3 037 647$
7	80 920 114$	244 664 106$	180 510 004$	132 029 837$	256 433 977$	64 154 103$	112 634 270$	11 769 870$
8	50 913 700$	138 160 471$	97 735 164$	67 814 537$	145 090 142$	40 425 307$	70 345 935$	6 929 671$
SUBTOTAL	319 779 596$	612 349 260$	424 985 283$	273 774 415$	659 459 141$	187 363 977$	338 574 845$	47 109 880$
NB								
1	7 337 106$	4 236 057$	3 564 257$	2 398 450$	4 741 568$	671 800$	1 837 607$	505 511$
2	4 352 807$	840 711$	544 498$	(375 519$)	944 268$	296 214$	1 216 230$	103 557$
3	1 105 903$	213 597$	138 339$	(95 407$)	239 907$	75 258$	309 003$	26 310$
4	498 581$	287 854$	242 203$	162 983$	322 205$	45 651$	124 871$	34 351$
5	405 555$	78 330$	50 731$	(34 987$)	87 978$	27 598$	113 317$	9 649$
6	419 117$	80 949$	52 428$	(36 157$)	90 920$	28 521$	117 107$	9 971$
7	726 343$	140 288$	90 859$	(62 662$)	157 568$	49 429$	202 950$	17 280$
8	1 084 105$	625 905$	526 642$	354 386$	700 597$	99 263$	271 518$	74 692$
9	650 800$	125 697$	81 409$	(56 145$)	141 180$	44 288$	181 842$	15 483$
10	687 673$	132 819$	86 022$	(59 326$)	149 179$	46 797$	192 144$	16 360$
11	610 117$	117 839$	76 320$	(52 635$)	132 355$	41 519$	170 475$	14 515$
13	6 226$	3 595$	3 025$	2 035$	4 024$	570$	1 559$	429$
SUBTOTAL	17 884 333$	6 883 640$	5 456 732$	2 145 017$	7 711 750$	1 426 908$	4 738 624$	828 109$
PEI								
1	329 073$	(5 129$)	(51 619$)	(133 665$)	33 489$	46 489$	128 536$	38 618$
2	669 132$	(10 430$)	(104 961$)	(271 792$)	68 095$	94 531$	261 362$	78 526$
3	408 482$	(6 367$)	(64 075$)	(165 920$)	41 570$	57 708$	159 553$	47 937$
4	745 375$	(11 619$)	(116 920$)	(302 761$)	75 854$	105 302$	291 142$	87 473$

TABLE 11: ANNUAL DIFFERENCES IN CONSUMER SURPLUS BETWEEN TWO SCENARIOS

	DIFFERENCE INIT.-CUR.	DIFFERENCE CUR.-STAT.Q	DIFFERENCE CUR.-CAN	DIFFERENCE CUR.-CAN+US	DIFFERENCE CUR.-(+10%)	DIFFERENCE CAN-STAT.Q	DIFFERENCE CAN+US-STAT.Q	DIFFERENCE STAT3.Q-(+10%)
5	1 065 060$	(16 602$)	(167 067$)	(432 613$)	108 388$	150 465$	416 011$	124 989$
6	461 730$	(7 197$)	(72 428$)	(187 548$)	46 989$	65 230$	180 351$	54 186$
SUBTOTAL	3 678 853$	(57 344$)	(577 069$)	(1 494 300$)	374 385$	519 725$	1 436 955$	431 729$
NOVA SCOTIA								
1	3 803 797$	(1 470 741$)	(1 540 658$)	(2 002 243$)	(1 422 107$)	69 917$	531 501$	48 635$
2	577 523$	(122 980$)	(200 706$)	(330 879$)	(50 261$)	77 726$	207 900$	72 719$
3	969 741$	(206 500$)	(337 013$)	(555 5\2$)	(84 394$)	130 514$	349 092$	122 105$
4	1 528 326$	(325 447$)	(531 138$)	(875 621$)	(133 007$)	205 691$	550 174$	192 440$
5	1 044 390$	(189 882$)	(355 233$)	(612 587$)	(34 128$)	165 351$	422 705$	155 754$
6	1 405 220$	(205 802$)	(466 700$)	(846 958$)	41 379$	260 897$	641 156$	247 181$
7	951 225$	(139 312$)	(315 919$)	(573 325$)	28 010$	176 607$	434 013$	167 322$
8	1 818 105$	(266 271$)	(603 826$)	(1 095 813$)	53 536$	337 555$	829 542$	319 808$
9	514 352$	(93 515$)	(174 949$)	(301 693$)	(16 808$)	81 434$	208 178$	76 707$
10	1 016 301$	(399 279$)	(524 048$)	(611 511$)	(344 263$)	124 770$	212 233$	55 016$
11	830 914$	(326 445$)	(428 455$)	(499 963$)	(281 465$)	102 010$	173 519$	44 980$
12	2 453 223$	(963 809$)	(1 264 987$)	(1 476 112$)	(831 007$)	301 178$	512 303$	132 802$
13	422 313$	(165 916$)	(217 763$)	(254 107$)	(143 055$)	51 847$	88 191$	22 861$
14	9 621 477$	(3 673 070$)	(3 910 566$)	(5 062 007$)	(3 525 924$)	237 496$	1 388 937$	147 146$
15	45 284 986$	(17 509 479$)	(18 341 854$)	(23 837 109$)	(16 930 474$)	832 375$	6 327 630$	579 005$
16	13 400 394$	(5 181 274$)	(5 427 584$)	(7 053 699$)	(5 009 939$)	246 310$	1 872 425$	171 335$
17	3 746 150$	(1 448 452$)	(1 517 310$)	(1 971 898$)	(1 400 555$)	68 857$	523 446$	47 898$
18	2 183 242$	(844 152$)	(884 282$)	(1 149 215$)	(816 238$)	40 130$	305 062$	27 915$
SUBTOTAL	91 571 680$	(33 532 326$)	(37 042 992$)	(49 110 333$)	(30 900 698$)	3 510 665$	15 578 007$	2 631 628$
NFLD								
1	1 371 374$	788 387$	529 837$	341 562$	880 666$	258 550$	446 825$	92 279$
2	373 636$	522 160$	477 069$	454 233$	537 053$	45 092$	67 927$	14 893$
3	133 532$	186 612$	170 497$	162 336$	191 934$	16 115$	24 276$	5 322$
4	1 964 412$	1 129 318$	758 960$	489 267$	1 261 502$	370 358$	640 051$	132 184$
5	732 427$	423 468$	283 639$	8 581$	526 291$	139 829$	414 886$	102 823$
6	301 063$	173 078$	116 317$	74 984$	193 336$	56 760$	98 093$	20 258$
SUBTOTAL	4 876 444$	3 223 022$	2 336 318$	1 530 963$	3 590 783$	886 704$	1 692 059$	367 761$
TOTAL	552 591 417$	655 437 949$	432 632 871$	225 015 526$	723 809 028$	222 805 079$	430 422 423$	68 371 079$

VALUES IN PARENTHESES ARE NEGATIVE

TABLE 12: ANNUAL DIFFERENCES IN FISHING DAYS BETWEEN TWO SCENARIOS

	DIFF. INIT.-CUR.	DIFF. CUR.-STAT.Q	DIFF. CUR.-CAN	DIFF. CUR.-CAN+US	DIFF. CUR.-(+10%)	DIFF. CAN-STAT.Q	DIFF. CAN+US-STAT.Q	DIFF. STAT.Q-(+10%)
QUEBEC								
A	590 252	94 717	62 043	(44 293)	105 961	32 673	139 010	11 244
B	263 865	146 630	97 905	38 928	186 070	48 725	107 702	39 440
C	134 609	52 421	(9 626)	(68 860)	76 438	62 047	121 281	24 017
D	60 834	23 545	(4 448)	(31 171)	34 380	27 993	54 716	10 835
E	211 304	81 782	(15 450)	(108 272)	119 418	97 231	190 053	37 636
F	96 724	77 586	180 361	(8 063)	92 687	(102 775)	85 650	15 101
G	224 021	309 910	117 854	347	403 703	192 056	309 563	93 793
H	207 128	344 127	195 626	87 103	407 362	148 501	257 024	63 235
I	229 935	157 345	70 815	(7 613)	214 112	86 530	164 958	56 767
J	168 709	133 882	48 503	(36 841)	173 004	85 379	170 722	39 123
K	417 663	402 062	215 927	198 113	467 731	186 135	203 950	65 669
L	81 858	33 855	13 851	(6 655)	46 818	20 004	40 509	12 963
M	213 677	34 288	22 460	(16 035)	38 359	11 828	50 323	4 070
SUBTOTAL	2 960 579	1 892 149	995 822	(3 312)	2 366 042	896 328	1 895 461	473 893
ONTARIO								
1	5 540	12 743	8 120	3 015	14 979	4 623	9 727	2 236
2	4 313	5 624	4 491	2 603	6 487	1 133	3 022	863
3	12 917	12 030	7 214	1 521	15 786	4 816	10 508	3 756
4	3 146 223	(5 545)	(793 438)	(1 341 879)	408 831	787 893	1 336 334	414 376
5	1 068 012	3 344 833	2 473 800	1 598 310	3 533 506	871 033	1 746 523	188 673
6	293 058	1 478 046	1 258 618	1 057 303	1 542 336	219 428	420 744	64 289
7	1 730 686	5 232 776	3 860 674	2 823 800	5 484 505	1 372 102	2 408 976	251 729
8	1 165 801	3 163 542	2 237 900	1 552 789	3 322 214	925 642	1 610 752	158 673
SUBTOTAL	7 426 551	13 244 049	9 057 379	5 697 463	14 328 644	4 186 670	7 546 586	1 084 595
NB								
1	132 246	76 352	64 243	43 230	85 464	12 109	33 122	9 111
2	82 549	15 942	10 325	(7 121)	17 906	5 617	23 063	1 964
3	17 382	3 357	2 174	(1 500)	3 771	1 183	4 857	414
4	11 357	6 557	5 517	3 712	7 339	1 040	2 844	782
5	11 374	2 197	1 423	(981)	2 467	774	3 178	271
6	16 094	3 108	2 013	(1 388)	3 491	1 095	4 497	383
7	32 539	6 285	4 070	(2 807)	7 059	2 214	9 092	774
8	29 257	16 891	14 212	9 564	18 907	2 679	7 327	2 016
9	22 385	4 323	2 800	(1 931)	4 856	1 523	6 255	533
10	11 690	2 258	1 462	(1 008)	2 536	796	3 266	278
11	20 329	3 926	2 543	(1 754)	4 410	1 383	5 680	484
13	242	140	118	79	157	22	61	17
SUBTOTAL	387 437	141 337	110 902	38 095	158 362	30 435	103 242	17 026
PEI								
1	11 812	(184)	(1 853)	(4 798)	1 202	1 669	4 614	1 386
2	10 431	(163)	(1 636)	(4 237)	1 061	1 474	4 074	1 224
3	12 385	(193)	(1 943)	(5 031)	1 260	1 750	4 838	1 453

TABLE 12: ANNUAL DIFFERENCES IN FISHING DAYS BETWEEN TWO SCENARIOS

	DIFF. INIT.-CUR.	DIFF. CUR.-STAT.Q	DIFF. CUR.-CAN	DIFF. CUR.-CAN+US	DIFF. CUR.-(+10%)	DIFF. CAN-STAT.Q	DIFF. CAN+US-STAT.Q	DIFF. STAT.Q-(+10%)
4	14 249	(222)	(2 235)	(5 788)	1 450	2 013	5 565	1 672
5	20 980	(327)	(3 291)	(8 522)	2 135	2 964	8 195	2 462
6	10 716	(167)	(1 681)	(4 353)	1 091	1 514	4 186	1 258
SUBTOTAL	80 572	(1 256)	(12 639)	(32 727)	8 200	11 383	31 471	9 455
NOVA SCOTIA								
1	132 283	(51 147)	(53 579)	(69 631)	(49 456)	2 431	18 484	1 691
2	23 040	(4 906)	(8 007)	(13 200)	(2 005)	3 101	8 294	2 901
3	32 748	(6 973)	(11 381)	(11 381)	(2 850)	4 407	4 407	4 123
4	45 637	(9 718)	(15 860)	(15 860)	(3 972)	6 142	6 142	5 746
5	35 224	(6 404)	(11 981)	(11 981)	(1 151)	5 577	5 577	5 253
6	36 068	(5 282)	(11 979)	(11 979)	1 062	6 697	6 697	6 344
7	25 028	(3 666)	(8 312)	(8 312)	737	4 647	4 647	4 403
8	39 396	(5 770)	(13 084)	(13 084)	1 160	7 314	7 314	6 930
9	12 584	(2 288)	(4 280)	(4 280)	(411)	1 992	1 992	1 877
10	24 369	(9 574)	(12 565)	(12 565)	(8 255)	2 992	2 992	1 319
11	27 669	(10 871)	(14 267)	(14 267)	(9 373)	3 397	3 397	1 498
12	67 354	(24 640)	(33 277)	(33 277)	(20 832)	8 637	8 637	3 809
13	11 518	(4 525)	(5 939)	(5 939)	(3 902)	1 414	1 414	624
14	305 390	(116 585)	(124 123)	(124 123)	(111 915)	7 538	7 538	4 670
15	1 298 832	(502 195)	(526 068)	(526 068)	(485 588)	23 874	23 874	16 607
16	384 827	(148 794)	(155 867)	(155 867)	(143 873)	7 073	7 073	4 920
17	139 090	(53 779)	(56 336)	(56 336)	(52 001)	2 557	2 557	1 778
18	80 050	(30 952)	(32 423)	(32 423)	(29 928)	1 471	1 471	1 024
SUBTOTAL	2 721 107	(998 068)	(1 099 330)	(1 120 575)	(922 551)	101 262	122 507	75 517
NFLD								
1	35 511	20 415	13 720	13 720	22 804	6 695	6 695	2 390
2	10 724	14 986	13 692	13 692	15 414	1 294	1 294	427
3	4 898	6 845	6 254	6 254	7 040	591	591	195
4	57 579	33 102	22 246	22 246	36 976	10 856	10 856	3 874
5	26 050	15 061	10 088	10 088	18 718	4 973	4 973	3 657
6	6 237	3 586	2 410	2 410	4 005	1 176	1 176	420
SUBTOTAL	140 999	93 995	68 410	68 410	104 958	25 585	25 585	10 963
TOTAL	13 657 244	14 372 206	9 120 543	4 647 353	16 043 655	5 251 663	9 724 852	1 671 449

VALUES IN PARENTHESES ARE NEGATIVE

CONCLUSION

The estimation of the change in the economic value of recreational fishing as a function of the level of acidification of Canadian water bodies where this sport takes place presents major challenges.

The first and most important is the development of a reliable econometric model to predict the effects of acidification on the demand for fishing, expressed as the number of fishing days per fishing zone. On the basis of our research, we have been able to estimate the existence of a significant relationship between fishing demand and the biological productivity of water bodies, expressed as biomass (in grams) per unit of catch effort.

The second part of our approach consists of applying the travel cost method in order to estimate the economic value associated with a reduction in the number of fishing days due to the acidification of water.

The decrease in economic value is a monetary estimation of the loss of satisfaction of anglers, not in a drop in the sales by the recreational fishing industry. Nor does it include the decrease in satisfaction of non-users in learning about the condition of the lakes and rivers in their region.

Without additional measures to control acid gas emissions, the impact of acidification of lakes and rivers on recreational fishing in Eastern Canada will stabilize within ten years at a level 26 per cent below the current level. This represents loss of 14.4 million fishing days, which corresponds to an economic loss of $655 million a year, or $4.4 billion in discounted 1988 dollars, relative to 1988.

Control measures taken by Canada alone would reduce acid emissions affecting our regions by 21 per cent. The drop in demand would be smaller: only 9.1 million fishing days (17 per cent of the current total). The corresponding monetary loss would be $433 million a year. This represents a loss in discounted 1988 dollars of 2.9 billion, and $1.5 billion (34 per cent) less than the losses corresponding to no additional control measures.

If Canada and the United States joined forces to resolve this ecological problem, acid rain pollution in our regions would be reduced by 42 per cent. The drop in demand would be only 4.6 million fishing days (8 per cent of the current total), which corresponds to an annual monetary loss of $225 million. In discounted 1988 dollars, this means a loss of 1.5 billion, which is $2.9 billion (66 per cent) less than the losses that would occur without additional control measures.

A hypothetical increase of 10 per cent in acid rain emissions in North America would result in an estimated decline in demand of 16 million fishing days (29 per cent of the current total). The corresponding economic loss would be $723 million per year. In discounted 1988 dollars, this would mean a loss of 4.8 billion dollars: 400 million more than the accumulated losses if the status quo in terms of acid emissions were maintained.

TABLE 13 : DIFFERENCE IN CONSUMER SURPLUS IN DISCOUNTED DOLLARS

	DIFFERENCE CUR-STAT	DIFFERENCE CUR-CAN	DIFFERENCE CAN-STAT Q	DIFFERENCE CUR-CAN+US	DIFFERENCE CAN-US-STAT Q	DIFFERENCE CUR-(+10%)	DIFFERENCE STAT Q-(+10%)
Quebec	$444,288,741	$250,099,407	$194,189,334	($12,214,701)	$456,503,442	$557,757,154	$113,468,413
Ontario	$4,086,719,950	$2,836,283,063	$1,250,436,887	$1,827,126,178	$2 259,593,772	$4 401,123,673	$314,403,724
NB	$45,940,303	$36,417,349	$9,522,955	$14,315,494	$31,624,810	$51,466,971	$5,526,667
PEI	($382,706)	($3,851,268)	$3,468,561	($9,972,714)	$9,590,007	$2,498,584	$2,881,291
NS	($223,789,322)	($247,218,936)	$23,429,613	($327,754,422)	$103,965,099	($206,226,265)	$17,563,057
Nfld	$21,509,927	$15,592,209	$5,917,718	$10,217,399	$11,292,528	$23,964,302	$2,454,375
Total	$4,374,286,892	$2,887,321,823	$1,486,965,069	$1,501,717,233	$2,872,569,658	$4,830,584,419	$456,297,527

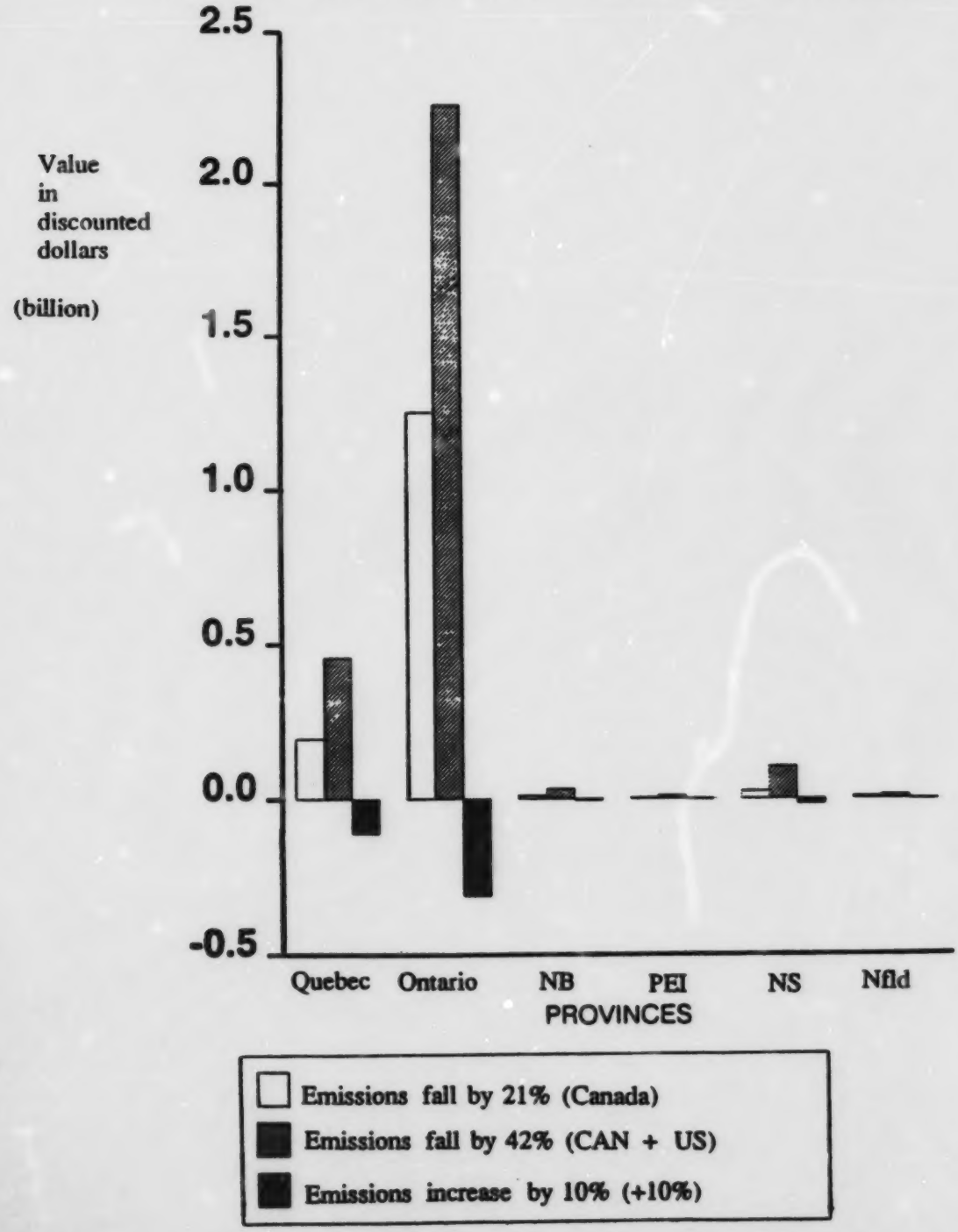
TABLE 14 : AVERAGE VALUE OF A FISHING DAY BY PROVINCE

	Current Sc	Initial Sc	Status quo sc	Canada sc	Can+US sc	+10% sc
Quebec	$37.02	$37.41	$37.27	$36.98	$37.12	$37.31
Ontario	$45.56	$45.11	$45.13	$45.07	$45.06	$45.23
NB	$46.19	$46.18	$45.91	$45.93	$45.91	$45.87
PEI	$45.66	$45.66	$45.66	$45.66	$45.66	$45.66
NS	$34.56	$33.90	$34.09	$34.11	$39.38	$34.06
Nfld	$34.58	$34.58	$34.59	$34.59	$35.01	$34.60
Eastern Canada	$42.50	$42.09	$41.40	$41.52	$41.95	$41.42

The results of this study would appear to indicate that, having reached this stage, the acidification of water bodies in our regions is a virtually irreversible phenomenon, at least in the near future. Nonetheless, energetic, and if possible joint, action by Canada and the US would make it possible to slow down the process of acidification and to substantially reduce the economic losses related to the decline in fishing activities.

FIGURE 7

VARIATION IN THE ECONOMIC VALUE OF FISHING, IN RELATION TO AN ACID EMISSIONS CONTROL POLICY COMPARE TO THE STATUS QUO OVER A 50-YEAR PERIOD 1988-2038 (IN DISCOUNTED DOLLARS)



BIBLIOGRAPHY

CESARIO, F.J. (1976) *Value of time in recreation benefit studies,* Land economics, 52, 1, pp.32-41

CLAWSON, M. et KNETSCH J.L. (1966) *Economics of outdoor recreation,* John Hopkins University Press, troisième édition, 328 p.

FRENETTE, J.J. (1986) *Effet de l'acidité sur les communautés ichtyologiques de 17 lacs du Témiscamingue,* Direction des relevés aquatiques, ministre de l'Environnement du Québec, Publication no.PA-23, 102 p.

FRENETTE, J.J., Y. RICHARD et G. MOREAU (1985) *Effets de l'acidité des lacs du Québec sur la faune ichtyologique: une revue*, Ministère de l'Environnement du Québec, Direction des relevés aquatiques, rapport PA-20, Envirodoq 850745, 30 p.

HUNTLEY, R.V. et RIVERS, R.Z. (1986) *Proceedings of the acid rain evaluation seminar*, Pêches et des Océans Canada, Ottawa, 116 p.

MICHAUD, L. (1983) *Projet Archipel : Analyse avantages-coûts*, Cerac inc., Montréal

MICHAUD, L. (1987) *L'impact de l'acidification des plans d'eau sur la valeur économique de pêche récréative au Québec,* Ministère des Pêcheries et des Océans, Ottawa, 84 p.

MULLEN, J.K. et MENZ, F.C. (1985) *The effect of acidification damages on the economic value of the Adirondack fishery to New York anglers,* American Journal of Agricultural Economics, février, pp. 112-119.

SEELEY (1973) *Economics of outdoor recreation*, Outdoor Recreation and the Urban Environment, eds. Macmillan, chap.3 pp. 52-93.

SMITH, V.K. et KOOP, R.J. (1980) *The spatial limits of the travel cost recreational demand model*, Land Economics, 56, pp. 64-72.

VICTOR et BURRELL (1983) *An economic assessment of acid rain impacts on sport fishing in the Haliburton/Muskoka region*, Fisheries and Wildlife Department, Michigan State University, 75 p.

WILMAN, E.A. (1980) *The value of time recreation benefic studies*, Journal of Environmental Economics and Management, 7, pp. 272-280.

WOOLEY,F. (1985) *The travel cost method : Potential use in evaluating the B.C. tidal sport fishery*, Department of Fisheries and Oceans, Pacific Region, June 1985, 33p.

APPENDIX 1

FISHING ZONES PER PROVINCE

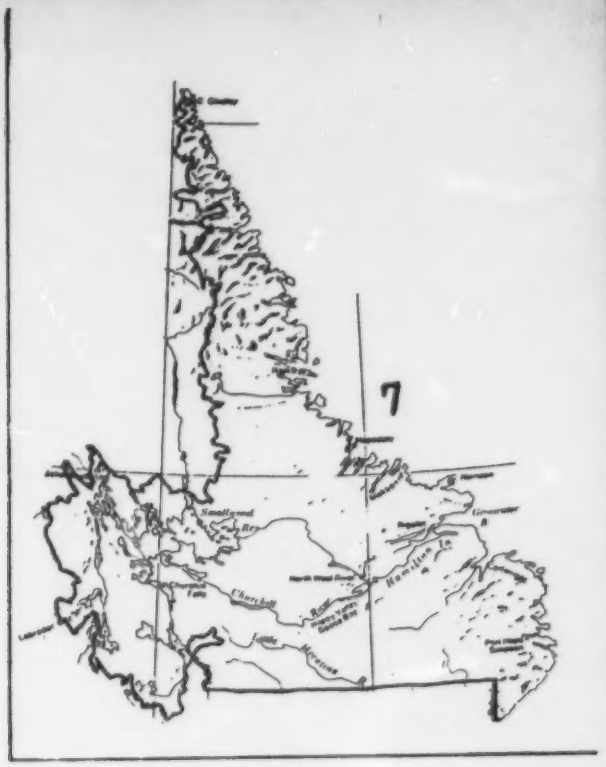
Ungava
Bay
James
Bay
QUEBEC
M
L
K
J
I
H
G
F
E
D
C
A
Gulf
of

1
2
3
4
5
6
7
8
ONTARIO
Lake Superior
Lake Huron
Lake Ontario
Lake Erie

Campbellton
Dalhousie
10
3
Bathurst
Edmundston
Caraquet
9
5
Saint
John
Grand
Falls
1
Newcastle
Chatham
NEW
2
BRUNSWICK
7
Woodstock
Minto
R
1
Moncton
6
Sackville
FREDERICTON
Oromocto
Sussex
4
8
St
Stephen
Saint
John
11

PRINCE EDWARD ISLAND

CAPE BRETON ISLAND
Glace Bay
Sydney
SABLE ISLAND
Chéticamp
Canso
Port Hawkesbury
Antigonish
New Glasgow
Amherst
Springhill
Sheet Harbour
Dartmouth
HALIFAX
Lunenburg
Bridgewater
Liverpool
Kentville
Middleton
Digby
Shelburne
Baccaro Pt
Yarmouth
11
12
13
10
9
8
14
15
6
7
5
4
16
17
3
2
18
1



NEWFOUNDLAND

APPENDIX 2

POPULATIONS AND AVERAGE INCOMES BY FISHING ZONE

POPULATION AND AVERAGE INCOME PER FISHING ZONE

FZ	DR	% DR	Total Pop per DR	Average Income per DR	Population prop. DR	Total Income per DR	Total Pop. per FZ	Total Income Fishing Zone	Average Inc Fishing Zone 1981
Newfoundland									
1	9	100%	25738	$20,140	25738	$518,363,320	39808	$823,210,440	$20,679
	5	30%	46901	$21,666	14070	$304,847,120			
2	4	100%	27749	$17,329	27749	$480,862,421	67099	$1,315,927,156	$19,612
	6	50%	42008	$22,972	21004	$482,503,888			
	3	70%	26209	$19,217	18346	$352,560,847			
3	2	100%	30368	$18,732	30368	$568,853,376	30368	$568,853,376	$18,732
4	1	100%	239410	$22,660	239410	$5,425,030,600	239410	$5,425,030,600	$22,660
5	3	30%	26209	$19,217	7863	$151,097,506	63617	$1,201,805,184	$18,891
	7	80%	43438	$16,351	34750	$568,203,790			
	6	50%	42008	$22,972	21004	$482,503,888			
	10	100%	31318	$18,183	31318	$569,455,194			
6	7	20%	43438	$16,351	8688	$142,050,948	96060	$1,798,682,838	$18,725
	8	100%	54542	$17,332	54542	$945,321,944			
	5	70%	46901	$21,666	32831	$711,309,946			
Prince Edwards Island									
1	3	40%	42821	$18,233	17128	$312,302,117	17128	$312,302,117	$18,233
2	2	35%	60470	$20,669	21165	$437,449,051	21165	$437,449,051	$20,669
3	1	50%	19215	$17,329	9608	$166,488,368	9608	$166,488,368	$17,329
4	3	60%	42821	$18,233	25693	$468,453,176	25693	$468,453,176	$18,233
5	2	65%	60470	$20,669	39306	$812,405,380	39306	$812,405,380	$20,669
6	1	50%	19215	$18,233	9608	$175,173,548	9608	$175,173,548	$18,233
Nova-Scotia									
1	2	100%	26290	$18,636	26290	$489,940,440	26290	$489,940,440	$18,636
2	3	100%	21689	$16,797	21689	$364,310,133	21689	$364,310,133	$16,797
3	5	100%	22522	$17,538	22522	$394,990,836	22522	$394,990,836	$17,538
4	7	100%	49739	$18,331	49739	$911,765,609	49739	$911,765,609	$18,331

POPULATION AND AVERAGE INCOME PER FISHING ZONE

FZ	DR	% DR	Total Pop per DR	Average Income per DR	Population prop. DR	Total Income per DR	Total Pop. per FZ	Total Income Fishing Zone	Average Inc Fishing Zone 1981
5	8	100%	33121	$18,908	33121	$626,251,868	33121	$626,251,868	$18,908
6	10	100%	43224	$18,941	43224	$818,705,784	43224	$818,705,784	$18,941
7	11	100%	35231	$16,650	35231	$586,596,150	35231	$586,596,150	$16,650
8	12	100%	50350	$19,147	50350	$964,051,450	50350	$964,051,450	$19,147
9	14	100%	18110	$20,177	18110	$365,405,470	18110	$365,405,470	$20,177
10	15	100%	22337	$19,602	22337	$437,849,874	22337	$437,849,874	$19,602
11	18	100%	8432	$17,420	8432	$146,885,440	8432	$146,885,440	$17,420
12	17	100%	127035	$19,892	127035	$2,526,980,220	127035	$2,526,980,220	$19,892
13	16	100%	12284	$17,417	12284	$213,950,428	12284	$213,950,428	$17,417
14	13	100%	12752	$16,142	12752	$205,842,784	12752	$205,842,784	$16,142
15	9	100%	288126	$23,569	288126	$6,790,841,694	288126	$6,790,841,694	$23,569
16	6	100%	45746	$19,675	45746	$900,052,550	45746	$900,052,550	$19,675
17	4	100%	13126	$18,185	13126	$238,696,310	13126	$238,696,310	$18,185
18	1	100%	17328	$18,558	17328	$321,573,024	17328	$321,573,024	$18,558
New-Brunswick									
1	15	100%	86156	$19,620	86156	$1,690,380,720	130811	$2,541,969,646	$19,432
	9	30%	54134	$17,776	16240	$288,685,795			
	14	70%	40593	$19,810	28415	$562,903,131			
2	9	70%	54134	$17,776	37894	$673,600,189	68693	$1,198,291,953	$17,444
	8	100%	30799	$17,036	30799	$524,691,764			
3	1	100%	86148	$21,614	86148	$1,862,002,872	281019	$5,990,285,679	$21,316
	5	100%	51114	$23,105	51114	$1,180,988,970			
	4	100%	12485	$17,217	12485	$214,954,245			
	7	100%	107640	$20,219	107640	$2,176,373,160			
	6	100%	23632	$23,526	23632	$555,966,432			
4	2	100%	26571	$18,982	26571	$504,370,722	146455	$2,980,006,257	$20,348
	3	100%	21012	$20,861	21012	$438,331,332			
	10	100%	74213	$21,952	74213	$1,629,123,776			
	11	100%	24659	$16,553	24659	$408,180,427			

POPULATION AND AVERAGE INCOME PER FISHING ZONE

FZ	DR	% DR	Total Pop per DR	Average Income per DR	Population prop. DR	Total Income per DR	Total Pop. per FZ	Total Income Fishing Zone	Average Income Fishing Zone 1981
5	12	100%	20815	$15,639	20815	$325,525,785	69425	$1,254,630,703	$18,072
	14	30%	40593	$19,818	12178	$241,341,622			
	13	100%	36432	$18,878	36432	$687,763,296			
Ontario									
1	59	100%	22798	$22,094	22798	$503,699,012	52509	$1,189,357,931	$22,651
	60	50%	59421	$23,078	29711	$685,658,919			
2	58	100%	153997	$26,297	153997	$4,049,659,109	165881	$4,323,922,677	$26,066
	60	20%	59421	$23,078	11884	$274,263,568			
3	60	30%	59421	$23,078	17826	$411,395,351	169523	$3,808,371,265	$22,465
	56	100%	96875	$23,810	96875	$2,306,593,750			
	52	50%	27068	$21,334	13534	$288,734,356			
	54	100%	41288	$19,416	41288	$801,647,808			
4	57	100%	133553	$25,427	133553	$3,395,852,131	374055	$8,867,759,869	$23,707
	52	50%	27068	$21,334	13534	$288,734,356			
	53	100%	159779	$23,784	159779	$3,800,183,736			
	48	70%	80268	$21,469	56188	$1,206,291,584			
	51	100%	11001	$16,062	11001	$176,698,062			
5	48	30%	80268	$21,469	24080	$516,982,108	194823	$3,864,793,996	$19,837
	49	100%	33528	$17,611	33528	$590,461,608			
	44	100%	38370	$19,856	38370	$761,874,720			
	46	100%	11361	$16,984	11361	$192,955,224			
	47	100%	87484	$20,604	87484	$1,802,520,336			
6	1	100%	20254	$22,063	20254	$446,864,002	1097762	$27,171,723,501	$24,752
	2	100%	30365	$21,675	30365	$658,161,375			
	3	100%	22412	$23,751	22412	$532,307,412			
	4	100%	61927	$20,637	61927	$1,277,907,499			
	5	100%	18946	$21,751	18946	$412,094,446			
	6	100%	546849	$28,003	546849	$15,313,412,547			
	7	100%	27176	$21,604	27176	$587,110,304			
	8	100%	53765	$22,010	53765	$1,183,367,650			
	9	100%	45676	$21,800	45676	$995,736,800			
	10	100%	108133	$22,226	108133	$2,403,364,058			
	11	100%	33040	$20,785	33040	$686,736,400			
	12	100%	106883	$20,720	106883	$2,214,615,760			
	13	100%	22336	$20,593	22336	$459,965,248			
7	14	100%	64966	$21,489	64[illegible]	,396,054,374	4798354	$130,510,864,201	$27,199
	15	100%	102452	$21,941	10[illegible]	$2,247,899,332			
	16	100%	47854	$20,017	47854	$957,893,518			
	18	100%	283639	$27,235	233639	$7,724,908,165			
	19	100%	252053	$33,288	252053	$8,390,340,264			

POPULATION AND AVERAGE INCOME PER FISHING ZONE

FZ	DR	% DR	Total Pop per DR	Average Income per DR	Population prop. DR	Total Income per DR	Total Pop. per FZ	Total Income Fishing Zone	Average Income Fishing Zone 1981
	20	100%	2137395	$27,476	2137395	$58,727,065,020			
	21	100%	490731	$31,501	490731	$15,458,517,231			
	22	100%	31145	$24,101	31145	$750,625,645			
	43	100%	225071	$22,708	225071	$5,110,912,268			
	23	100%	129432	$24,001	129432	$3,106,497,432			
	24	100%	253883	$32,208	253883	$8,177,063,664			
	25	100%	411445	$23,896	411445	$9,831,889,720			
	26	100%	368288	$23,436	368288	$8,631,197,568			
B	28	100%	89456	$23,120	89456	$2,068,222,720	1772200	$40,861,200,644	$23,057
	29	100%	104427	$22,845	104427	$2,385,634,815			
	30	100%	305496	$24,354	305496	$7,440,049,584			
	31	100%	66096	$21,988	66096	$1,453,318,848			
	32	100%	85920	$22,470	85920	$1,930,622,400			
	34	100%	69707	$22,102	69707	$1,540,664,114			
	36	100%	107022	$22,356	107022	$2,392,583,832			
	37	100%	312476	$22,885	312476	$7,151,013,260			
	38	100%	123445	$25,304	123445	$3,123,652,280			
	39	100%	318184	$23,589	318184	$7,505,642,376			
	40	100%	56127	$20,413	56127	$1,145,720,451			
	41	100%	60020	$21,683	60020	$1,301,413,660			
	42	100%	73824	$19,271	73824	$1,422,662,304			

Quebec

A	1	100%	14310	$23,214	14310	$332,192,340	168583	$3,392,854,797	$20,126
	2	100%	41173	$21,765	41173	$896,130,345			
	3	100%	18943	$20,727	18943	$392,631,361			
	4	100%	40487	$19,143	40487	$775,042,641			
	5	100%	23715	$18,681	23715	$443,019,915			
	6	100%	29955	$18,489	29955	$553,837,995			
B	7	100%	69099	$21,815	69099	$1,507,394,685	431249	$9,115,705,077	$21,138
	8	100%	41250	$19,804	41250	$816,915,000			
	9	100%	19479	$17,157	19479	$334,201,203			
	10	100%	28642	$18,748	28642	$536,980,216			
	13	100%	22062	$18,268	22062	$403,028,616			
	14	100%	25678	$19,706	25678	$506,010,668			
	15	100%	23559	$19,725	23559	$464,701,275			
	21	100%	94104	$25,006	94104	$2,353,164,624			
	22	100%	33949	$19,692	33949	$668,523,708			
	23	100%	73427	$20,766	73427	$1,524,785,082			
C	28	50%	29563	$20,030	14782	$296,073,445	610916	$12,514,755,839	$20,485
	27	100%	57892	$21,815	57892	$1,262,913,980			
	26	100%	15635	$17,493	15635	$273,503,055			
	25	100%	20536	$18,340	20536	$376,630,240			

POPULATION AND AVERAGE INCOME PER FISHING ZONE

FZ	DR	% DR	Total Pop per DR	Average Income per DR	Population prop. DR	Total Income per DR	Total Pop. per FZ	Total Income Fishing Zone	Average Inc Fishing Zone 1981
	24	100%	26814	$18,572	26814	$497,989,608			
	34	100%	59277	$21,316	59277	$1,263,548,532			
	35	100%	40871	$21,248	40871	$868,427,008			
	36	100%	115983	$21,036	115983	$2,439,818,388			
	37	100%	38186	$19,251	38186	$735,118,686			
	38	100%	17436	$20,420	17436	$356,043,120			
	39	100%	70733	$20,598	70733	$1,456,958,334			
	40	100%	26840	$21,160	26840	$567,934,400			
	41	100%	69770	$19,808	69770	$1,382,004,160			
	54	100%	36161	$20,403	36161	$737,792,883			
D	28	50%	29563	$20,030	14782	$296,073,445	87540	$1,753,552,131	$20,031
	42	100%	14797	$18,432	14797	$272,738,304			
	33	100%	35513	$20,530	35513	$729,081,890			
	47	20%	20763	$17,919	4153	$74,410,439			
	49	20%	31096	$18,979	6219	$118,034,197			
	58	20%	60384	$21,795	12077	$263,213,856			
E	50	100%	53058	$22,970	53058	$1,218,742,260	3184061	$76,033,333,133	$23,879
	51	100%	55888	$21,799	55888	$1,218,302,512			
	52	100%	42391	$26,079	42391	$1,105,514,889			
	53	100%	23180	$22,043	23180	$510,956,740			
	55	100%	55576	$22,033	55576	$1,224,506,008			
	56	100%	307090	$25,779	307090	$7,916,473,110			
	57	100%	63353	$26,658	63353	$1,688,864,274			
	62	100%	109705	$25,553	109705	$2,803,291,865			
	64	100%	268335	$27,187	268335	$7,295,223,645			
	65	100%	1760122	$22,794	1760122	$40,120,220,868			
	66	100%	105962	$27,793	105962	$2,945,001,866			
	67	100%	13562	$23,204	13562	$314,692,648			
	68	100%	16953	$18,529	16953	$314,122,137			
	69	100%	59968	$25,436	59968	$1,525,346,048			
	70	100%	54034	$21,088	54034	$1,139,468,992			
	71	100%	15429	$23,002	15429	$354,897,858			
	72	100%	50043	$26,266	50043	$1,314,429,438			
	73	100%	71252	$23,355	71252	$1,664,090,460			
	63	30%	193865	$23,370	58160	$1,359,187,515			
F	74	100%	32454	$20,000	32454	$649,080,000	173275	$3,913,771,277	$22,587
	63	70%	193865	$23,370	135706	$3,171,437,535			
	61	20%	25577	$18,230	5115	$93,253,742			
G	75	100%	37975	$20,420	37975	$775,449,500	232729	$5,318,548,578	$22,853
	79	100%	131213	$23,616	131213	$3,098,726,208			
	78	50%	54229	$25,421	27115	$689,277,705			
	80	50%	20283	$18,387	10142	$186,471,761			
	83	50%	52570	$21,633	26285	$568,623,405			
H	32	20%	119595	$20,169	23919	$482,422,311	200552	$3,992,457,640	$19,907
	47	80%	20763	$17,919	16610	$297,641,758			

POPULATION AND AVERAGE INCOME PER FISHING ZONE

FZ	DR	% DR	Total Pop per DR	Average Income per DR	Population prop. DR	Total Income per DR	Total Pop. per FZ	Total Income Fishing Zone	Average Inc Fishing Zone 1981
	49	70%	31096	$18,979	21767	$413,119,689			
	58	60%	60384	$21,795	36230	$789,641,568			
	61	50%	27557	$18,230	13779	$251,182,055			
	76	100%	34395	$19,666	34395	$676,412,070			
	43	50%	107703	$20,093	53852	$1,082,038,190			
I	32	60%	119595	$20,169	71757	$1,447,266,933	685506	$15,945,821,937	$23,261
	43	50%	107703	$20,093	53852	$1,082,038,190			
	29	100%	58843	$21,560	58843	$1,268,655,080			
	20	100%	458980	$24,294	458980	$11,150,460,120			
	16	100%	6436	$27,122	6436	$174,557,192			
	17	100%	23048	$23,885	23048	$550,501,480			
	90	20%	62952	$21,631	12590	$272,342,942			
J	61	30%	27557	$18,230	8267	$150,709,233	175524	$3,859,373,730	$21,988
	58	20%	60384	$21,795	12077	$263,213,856			
	49	10%	31096	$18,979	3110	$59,017,098			
	84	100%	88529	$21,937	88529	$1,942,060,673			
	83	50%	52570	$21,633	26285	$568,623,405			
	80	50%	20283	$18,387	10142	$186,471,761			
	78	50%	54229	$25,421	27115	$689,277,705			
K	11	100%	17448	$21,692	17448	$378,482,016	263186	$5,845,725,849	$22,211
	12	100%	14172	$18,769	14172	$265,994,268			
	93	100%	47891	$21,389	47891	$1,024,340,599			
	90	60%	62952	$21,631	37771	$817,028,827			
	94	50%	174441	$22,669	87221	$1,977,201,515			
	97	30%	115881	$25,896	34764	$900,256,313			
	32	20%	119595	$20,169	23919	$482,422,311			
L	97	70%	115881	$25,896	81117	$2,100,598,063	180928	$4,350,142,520	$24,044
	94	50%	174441	$22,669	87221	$1,977,201,515			
	90	20%	62952	$21,631	12590	$272,342,942			
M	98	100%	115881	$25,896	115881	$3,000,854,376	115881	$3,000,854,376	$25,896

INDEXATION OF AVERAGE INCOME AND POPULATION BY PROVINCE BETWEEN 1981 AND 1985

	1981 Income	1985 Income	Corrective factor	1981 Population	1985 Population	Corrective factor
NB	20 112$	25 106$	1.256	696 645	710 422	1.02
NS	20 476$	27 273$	1.336	847 445	873 199	1.03
PEI	19 338$	25 457$	1.315	122 510	126 646	1.034
NFLD	21 198$	23 384$	1.134	567 680	568 349	1.001
QUE	22 869$	30 643$	1.324	6 438 400	6 540 270	1.016
ONT	25 577$	32 001$	1.296	8 625 100	9 113 515	1.057
ALTA	27 969$	36 796$	1.179	2 237 725	2 375 278	1.062
SASK	22 637$	30 786$	1.206	968 310	1 010 198	1.043
MAN	21 721$	31 262$	1.259	1 026 245	1 071 232	1.044
BC	26 171$	33 497$	1.147	2 744 470	2 889 207	1.053

APPENDIX 3

ORIGIN/DESTINATION MATRICES BY PROVINCE

FISHING BY ORIGINS/DESTINATIONS

10/26/88

By number of visits, all species, by unweighted values

LOC RICHARD Inc.
Economistes conseils
Logiciels experts
1400 Sauré Ouest 8200
Montréal, Qc, H4B 1C5

			DESTINATIONS													
			Region A	Region B	Region C	Region D	Region E	Region F	Region G	Region H	Region I	Region J	Region K	Region L	Region M	Mean Days total trips
		Gaspésie	1.00	1.00	4.00	6.00	-	-	-	4.33	3.00	1.00	3.18	4.40	1.44	1.03
			(2246)	(743)	(1)	(2)	-	-	-	(2)	(1)	(1)	(11)	(5)	(27)	(3041)
		Saguenay	6.00	3.00	-	-	-	5.00	-	5.00	1.00	2.60	1.00	5.00	7.21	1.10
			(2)	(2)	-	-	-	(2)	-	(5)	(66)	(5)	(2730)	(11)	(29)	(2854)
		Québec	8.36	1.00	9.06	3.68	26.00	-	8.00	2.18	1.00	2.44	2.42	3.18	5.38	1.44
	B		(28)	(722)	(44)	(12)	(1)	-	(2)	(17)	(1049)	(4)	(108)	(11)	(6)	(1999)
	U	Trois-Riv.	6.29	1.60	11.95	1.00	2.00	5.54	15.23	1.00	4.33	4.95	5.52	-	2.00	1.47
	E		(2)	(2)	(29)	(769)	(2)	(6)	(2)	(636)	(47)	(21)	(21)	-	(1)	(1542)
	R	Cant. Tour.	16.60	14.13	1.00	2.98	7.73	6.67	8.00	5.14	2.05	3.50	6.92	9.46	4.47	1.23
	E		(15)	(16)	(4471)	(16)	(2)	(2)	(6)	(26)	(14)	(27)	(65)	(10)	(9)	(4677)
	C	Montréal	4.18	5.20	6.97	7.81	1.00	1.00	4.52	5.20	3.88	5.38	6.41	3.30	11.08	1.71
			(22)	(10)	(86)	(41)	(2662)	(864)	(136)	(200)	(62)	(61)	(31)	(10)	(8)	(3978)
O		Outaouais	3.29	7.33	-	-	3.00	2.32	1.00	1.00	4.00	9.19	1.75	-	6.75	1.17
			(10)	(1)	-	-	(2)	(22)	(2767)	(365)	(2)	(139)	(4)	-	(4)	(3320)
R		Abit.-Tém.	3.64	6.46	-	-	3.50	3.00	1.00	1.33	5.50	1.00	11.50	1.00	4.94	1.12
			(5)	(2)	-	-	(2)	(1)	(114)	(2)	(4)	(4487)	(4)	(1)	(119)	(4743)
I		C-Nord-Qu.-M.	4.33	4.07	1.00	-	-	-	-	1.00	1.96	9.29	1.00	1.00	9.67	1.06
			(15)	(15)	(1)	-	-	-	-	(1)	(24)	(2)	(1742)	(1463)	(2)	(3271)
N		Newfoundland	-	-	-	-	-	-	-	-	-	-	-	1.17	1.93	1.37
			-	-	-	-	-	-	-	-	-	-	-	(2)	(1)	(2)
I		P.-E.-I.	2.52	1.93	-	-	-	-	-	-	-	-	-	-	-	2.24
			(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	(2)
N		Nova-Scotia	3.68	2.32	-	-	-	-	1.94	-	-	3.06	-	2.97	6.55	3.29
	C		(1)	(1)	-	-	-	-	(1)	-	-	(1)	-	(2)	(1)	(8)
S	A	Nou-Brunswick	3.43	3.25	6.20	6.91	1.95	6.74	-	-	-	-	-	2.66	7.32	2.14
	M		(6)	(2)	(1)	(1)	(1)	(1)	-	-	-	-	-	(4)	(1)	(19)
	A	Québec	2.45	2.29	3.61	3.89	2.82	2.94	3.52	5.14	3.64	3.53	3.73	2.63	11.95	3.48
	R		(26)	(17)	(82)	(15)	(44)	(16)	(413)	(11)	(11)	(649)	(41)	(68)	(9)	(1407)
	A	Manitoba	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Alberta	-	-	-	-	-	-	-	1.69	1.00	-	2.66	-	-	1.82
			-	-	-	-	-	-	-	(1)	(1)	-	(1)	-	-	(3)
		Brt.-Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
		East	4.93	4.00	6.13	6.99	5.07	5.29	5.02	7.57	5.26	5.03	6.76	4.07	10.52	5.31
	U		(29)	(19)	(34)	(6)	(18)	(6)	(98)	(7)	(7)	(161)	(29)	(139)	(19)	(549)
	S	Center	4.56	4.43	5.26	2.05	4.25	2.30	7.46	9.51	6.74	7.49	5.98	3.81	17.32	6.66
	A		(2)	(1)	(2)	(1)	(1)	(1)	(23)	(1)	(1)	(63)	(3)	(25)	(3)	(121)
		West	6.13	3.87	2.75	0.57	1.22	0.46	5.05	1.29	0.87	6.51	2.89	5.44	13.48	4.20
			(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(3)	(1)	(16)
		Mean Days	1.32	1.29	1.33	1.51	1.18	1.14	1.61	1.89	1.34	1.62	1.19	1.08	9.46	1.44
		(total resp.)	(2410)	(1560)	(4754)	(866)	(2543)	(522)	(1563)	(1288)	(1275)	(5591)	(4778)	(1759)	(240)	(63117)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

10/X/88

By number of visits, all species, by unweighted values

LUC RICHARD Inc.
Economistes conseils
Logiciels experts
1440 Sauvé Ouest #200
Montréal, Qc, H4N 1C5

			DESTINATIONS													
			Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Mean Days Total Trips
		1.North West	1.00	1.00	1.00	-	1.00	-	-	1.00	-	-	-	-	-	
	0		(3203)	(95)	(1)	-	(26)	-	-	(2)	-	-	-	-	-	1.00
		2.North Central	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	(3251)
	0		(229)	(2635)	(12)	(106)	(4)	-	-	-	-	-	-	-	-	1.00
	0	3.North	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	(3986)
			(1)	(55)	(4834)	(106)	(55)	(2)	(12)	(42)	-	-	-	-	-	1.00
	1	4.North East	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	(5107)
			(119)	(37)	(863)	(17185)	(257)	(67)	(64)	(127)	-	-	-	-	-	1.00
	6	5.Algonquin	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	(18719)
			(15)	(17)	(57)	(268)	(3612)	(123)	(121)	-	-	-	-	-	-	1.00
	0	6.Eastern	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	(4013)
			(68)	(64)	(126)	(168)	(1226)	(16880)	(217)	(56)	-	-	-	-	-	1.00
	1	7.Central	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	(12737)
			(95)	(160)	(309)	(1708)	(4765)	(1707)	(15435)	(1959)	-	-	-	-	-	1.00
	0	8.South West	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	(26142)
			(27)	(29)	(140)	(664)	(637)	(69)	(453)	(11435)	-	-	-	-	-	1.00
0		Newfoundland	-	-	-	-	-	-	-	1.00	-	-	-	-	-	(12454)
0		P.-E.-I.	-	-	-	-	-	-	-	(1)	-	-	-	-	-	1.00
			-	-	-	-	-	-	-	-	-	-	-	-	-	(1)
1		Nova Scotia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	1.00	-	-	-	-	-	-	-	-
6	(	New-Brunswick	-	-	-	-	-	(1)	-	-	-	-	-	-	-	1.00
	6		-	-	-	5.00	-	-	-	-	-	-	-	-	-	(1)
1	0	Quebec	-	1.00	2.22	3.27	2.60	1.78	6.15	-	-	-	-	-	-	5.00
	6		-	(13)	(19)	(14)	(10)	(195)	(11)	-	-	-	-	-	-	(1)
0	0	Manitoba	2.39	3.61	-	2.43	3.12	2.00	3.09	1.00	-	-	-	-	-	1.99
	6		(1056)	(12)	-	(6)	(3)	(2)	(2)	(1)	-	-	-	-	-	(264)
0		Saskatchewan	2.00	-	-	-	-	-	-	-	-	-	-	-	-	2.62
			(10)	-	-	-	-	-	-	-	-	-	-	-	-	(1088)
		Alberta	6.00	5.50	-	-	5.00	-	-	2.00	-	-	-	-	-	2.00
			(8)	(2)	-	-	(2)	-	-	(1)	-	-	-	-	-	(18)
		Brt.-Columbia	3.33	1.00	-	-	-	-	-	-	-	-	-	-	-	5.44
			(3)	(1)	-	-	-	-	-	-	-	-	-	-	-	(13)
		East	6.42	7.21	6.67	6.91	6.55	3.16	1.66	2.67	-	-	-	-	-	2.75
	0		(82)	(24)	(119)	(230)	(272)	(2569)	(1053)	(96)	-	-	-	-	-	(4)
	5	Center	6.76	6.71	5.98	5.97	7.87	7.67	6.61	1.27	-	-	-	-	-	3.10
	6		(2547)	(871)	(252)	(924)	(202)	(179)	(262)	(5379)	-	-	-	-	-	(5251)
		West	9.69	3.50	27.33	16.83	6.00	4.33	4.33	-	-	-	-	-	-	2.27
			(35)	(23)	(1)	(6)	(3)	(6)	(3)	-	-	-	-	-	-	(10602)
																7.06
																(61)
		Mean Days	2.62	1.71	1.29	1.29	1.27	1.44	1.14	1.00	-	-	-	-	-	
		(total resp.)	(7674)	(4972)	(6732)	(21318)	(10991)	(15721)	(18614)	(19019)						1.26 (104725)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

10/26/88

By days of fishing, all species, by household weighting

LUC RICHARD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest 6200
Montréal, Qc, H4N 1C5

			DESTINATIONS													
			Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Total Days Total Resp.
		1.North West	574390	3781	477	-	4490	-	-	232	-	-	-	-	-	583870
			(323)	(6)	(1)	-	(3)	-	-	(1)	-	-	-	-	-	(334)
	O	2.North Central	68946	987341	2882	29565	1106	-	-	-	-	-	-	-	-	1089980
			(43)	(529)	(4)	(15)	(2)	-	-	-	-	-	-	-	-	(592)
	R	3.North	115	7790	713861	19051	6727	230	2500	4840	-	-	-	-	-	754314
			(1)	(9)	(659)	(18)	(9)	(1)	(4)	(1)	-	-	-	-	-	(702)
	T	4.North East	17668	7340	132779	2590064	38561	10722	11216	18020	-	-	-	-	-	2934371
			(11)	(10)	(122)	(1793)	(46)	(12)	(18)	(14)	-	-	-	-	-	(2036)
	A	5.Algonquin	6077	9254	24765	116483	1469861	54200	57000	-	-	-	-	-	-	1723835
			(3)	(2)	(10)	(23)	(390)	(14)	(16)	-	-	-	-	-	-	(458)
	R	6.Eastern	11884	17503	49344	38044	429612	3093250	71042	14676	-	-	-	-	-	3726155
			(7)	(10)	(18)	(32)	(166)	(892)	(30)	(10)	-	-	-	-	-	(1173)
	I	7.Central	62150	91235	185492	925121	2669307	994245	7960767	1055783	-	-	-	-	-	13951701
			(14)	(23)	(67)	(240)	(566)	(208)	(1471)	(315)	-	-	-	-	-	(2904)
	O	8.South West	9163	8592	51441	220007	247345	27881	148017	3518168	-	-	-	-	-	4229414
			(8)	(7)	(18)	(86)	(105)	(18)	(81)	(1025)	-	-	-	-	-	(1258)
O		Newfoundland	-	-	-	-	-	-	-	114	-	-	-	-	-	114
			-	-	-	-	-	-	-	(1)	-	-	-	-	-	(1)
R		P.-E.-I.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
I		Nova Scotia	-	-	-	-	-	114	-	-	-	-	-	-	-	114
			-	-	-	-	-	(1)	-	-	-	-	-	-	-	(1)
G	C	New-Brunswick	-	-	-	571	-	-	-	-	-	-	-	-	-	571
	A		-	-	-	(1)	-	-	-	-	-	-	-	-	-	(1)
I	R	Quebec	-	1486	5020	5371	3200	29652	5371	-	-	-	-	-	-	60107
	A		-	(4)	(8)	(6)	(5)	(27)	(9)	-	-	-	-	-	-	(59)
R	O	Manitoba	312299	5020	-	1820	2171	686	914	114	-	-	-	-	-	323040
	A		(340)	(11)	-	(3)	(3)	(2)	(2)	(1)	-	-	-	-	-	(367)
S		Saskatchewan	3200	-	-	-	-	-	-	-	-	-	-	-	-	3200
			(9)	-	-	-	-	-	-	-	-	-	-	-	-	(9)
		Alberta	5485	1257	-	-	1143	-	-	229	-	-	-	-	-	8113
			(7)	(2)	-	-	(2)	-	-	(1)	-	-	-	-	-	(12)
		Brt.-Columbia	1143	114	-	-	-	-	-	-	-	-	-	-	-	1257
			(4)	(1)	-	-	-	-	-	-	-	-	-	-	-	(5)
		East	58172	27084	76488	129089	168811	797600	751831	27719	-	-	-	-	-	1538714
	O		(68)	(40)	(138)	(181)	(195)	(758)	(274)	(22)	-	-	-	-	-	(1636)
	S	Center	1298764	436052	167617	525435	169367	135900	179062	300369	-	-	-	-	-	3422575
	A		(2135)	(848)	(264)	(730)	(155)	(140)	(128)	(484)	-	-	-	-	-	(4944)
		West	30333	10171	1702	4970	3954	2931	1432	-	-	-	-	-	-	55495
			(39)	(29)	(2)	(9)	(7)	(5)	(6)	-	-	-	-	-	-	(97)
		Total Days	2450809	1613648	1411277	4742339	5706655	5157520	8592239	5140763	-	-	-	-	-	34814828
		(Total resp.)	(3012)	(1531)	(1321)	(3137)	(1654)	(2078)	(2067)	(1085)	-	-	-	-	-	(16685)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

By days of fishing, all species, by household weighting

10/25/88

LBC RICHARD Inc.
Econometrics consults
Logscrete reports
1000 Sauvé Ouest 8200
Montréal, Qc, H4R 1C3

ORIGINS		DESTINATIONS														
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Total Days Total Resp.
	1.Yarmouth	19300 (143)	2540 (41)	1092 (11)	-	-	-	-	-	-	-	-	-	-	23485 (200)
	2.Digby	1092 (11)	22178 (133)	328 (11)	-	-	-	-	-	-	-	-	-	-	23707 (140)
	3.Annapolis	-	3404 (51)	27936 (211)	-	220 (11)	-	-	-	-	-	-	109 (11)	-	25897 (291)
N	4.Kings	1092 (31)	1328 (41)	9324 (101)	50179 (271)	437 (21)	-	296 (21)	218 (11)	-	232 (11)	155 (11)	328 (11)	-	69936 (691)
O V A	5.Hants	655 (11)	-	218 (11)	2621 (61)	47631 (311)	-	3177 (41)	765 (21)	437 (11)	-	-	-	109 (11)	75108 (681)
S C	6.Cumberland	-	-	387	-	775	46171	4802	-	-	-	-	-	-	51334 (341)
O O	7.Colchester	-	-	-	-	-	18051	28970	1768	-	328	765	-	328	54910 (551)
T I	8.Pictou	-	-	874	218	-	765	639	53557	5709	-	-	-	-	102963 (911)
A I	9.Antigonish	-	-	-	-	-	218	-	218	8751	-	-	-	-	10212 (291)
G	10.Inverness	-	-	-	-	-	-	-	-	-	17659	-	546	1312	20756 (201)
I	11.Victoria	-	-	-	-	-	-	-	-	-	-	4925	-	-	5362 (61)
N	12.Cape Breton	109 (11)	-	-	-	-	546	-	218	1422	14136	40504	119137	10635	186120 (1491)
S	13.Richmond	-	-	-	-	-	-	-	-	-	218	-	-	6922	7140 (31)
	14.Guysborough	-	-	-	-	-	-	-	-	-	-	-	-	-	24943 (91)
	15.Halifax	328 (11)	-	2293 (71)	1088 (41)	6586 (141)	1934 (71)	4490 (101)	7866 (71)	985 (31)	4369 (21)	440 (21)	2200 (41)	-	242438 (2401)
	16.Lunenburg	-	-	-	2022 (21)	546 (11)	328 (11)	-	-	-	-	-	-	-	55290 (521)
	17.Queens	-	-	2184 (11)	546 (11)	-	232 (11)	-	546 (11)	109 (11)	387 (11)	77 (11)	-	-	21741 (231)
	18.Shelburne	-	-	-	-	-	-	-	-	-	-	-	-	-	13809 (81)
	Newfoundland	-	-	-	-	-	-	-	-	-	-	-	-	-	48 (11)
	P.-E.-I.	-	0 (11)	16 (11)	-	68 (31)	822 (111)	697 (31)	9 (11)	71 (31)	124 (41)	8 (11)	80 (11)	-	1959 (431)
C A	Nov-Brunswick	48 (11)	-	-	-	-	48	32	8	8	48	84	-	-	348 (141)
N A	Québec	56 (11)	56 (21)	64 (31)	8 (11)	16 (11)	56 (41)	29 (21)	67 (11)	-	662 (191)	114 (81)	402 (61)	102 (41)	2431 (891)
D A	Ontario	-	-	-	-	-	-	-	-	-	32 (11)	32 (11)	-	-	64 (21)
	Manitoba	-	-	-	-	48 (11)	-	-	-	-	-	-	-	-	48 (11)
	Saskatchewan	-	-	48 (31)	-	-	-	24 (21)	24 (11)	8 (11)	32 (21)	-	25 (31)	48 (21)	468 (221)
	Alberta	-	-	-	8 (11)	-	-	-	16 (11)	8 (11)	15 (11)	-	-	-	85 (61)
	Brt.-Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	East	133 (41)	147 (61)	105 (61)	150 (41)	95 (41)	330 (131)	757 (91)	122 (61)	138 (31)	3085 (541)	62 (71)	125 (41)	175 (21)	6740 (1701)
D S A	Center	33 (11)	-	22 (11)	16 (11)	-	-	91	-	95	191	22	22	11	740 (351)
	West	-	-	-	-	-	-	(21)	-	(31)	(101)	(21)	(21)	(11)	127 (51)
		-	-	-	-	-	29 (11)	-	35 (11)	-	49 (21)	-	-	-	
	Total Days (Total resp.)	22053 (201)	28704 (331)	49798 (581)	56854 (481)	51414 (591)	61511 (811)	42685 (701)	67189 (671)	10368 (401)	41560 (1361)	47187 (621)	122983 (921)	19643 (251)	1033273 (12941)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

10/26/88

By days of fishing, all species, by household weighting

LUC MICHAUD Inc.
Economistes conseils
Logiciels experts
1490 Sauvé Ouest 0200
Montréal, Qc, H4N 1C5

ORIGINS		DESTINATIONS: Reg. 14	Reg. 15	Reg. 16	Reg. 17	Reg. 18	Reg. 19	Reg. 20	Reg. 21	Reg. 22	Reg. 23	Reg. 24	Reg. 25	Reg. 26	Total Days Total Resp.
	1.Yarmouth	-	-	346	-	-	-	-	-	-	-	-	-	-	23486
		-	-	(1)	-	-	-	-	-	-	-	-	-	-	(20)
	2.Digby	-	-	-	-	-	-	-	-	-	-	-	-	-	23707
		-	-	-	-	-	-	-	-	-	-	-	-	-	(14)
	3.Annapolis	-	-	218	218	-	-	-	-	-	-	-	-	-	25897
A		-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	(29)
B	4.Kings	437	605	3604	1529	-	-	-	-	-	-	-	-	-	69936
V		(1)	(2)	(3)	(2)	-	-	-	-	-	-	-	-	-	(60)
A	5.Hants	697	19386	4411	-	-	-	-	-	-	-	-	-	-	75108
		(2)	(14)	(5)	-	-	-	-	-	-	-	-	-	-	(68)
S	6.Cumberland	-	-	-	-	-	-	-	-	-	-	-	-	-	51324
C		-	-	-	-	-	-	-	-	-	-	-	-	-	(34)
O	7.Colchester	4200	7767	109	320	-	-	-	-	-	-	-	-	-	34910
T		(6)	(9)	(1)	(1)	-	-	-	-	-	-	-	-	-	(59)
I	8.Pictou	33160	6053	-	-	-	-	-	-	-	-	-	-	-	102863
A		(25)	(6)	-	-	-	-	-	-	-	-	-	-	-	(91)
	9.Antigonish	4806	218	-	-	-	-	-	-	-	-	-	-	-	14212
		(6)	(1)	-	-	-	-	-	-	-	-	-	-	-	(20)
C	10.Inverness	1004	155	-	-	-	-	-	-	-	-	-	-	-	20756
		(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	(20)
I	11.Victoria	287	-	-	-	-	-	-	-	-	-	-	-	-	5312
		(1)	-	-	-	-	-	-	-	-	-	-	-	-	(6)
R	12.Cape Breton	765	-	546	-	109	-	-	-	-	-	-	-	-	188128
S		(2)	-	(2)	-	(1)	-	-	-	-	-	-	-	-	(149)
	13.Richmond	-	-	-	-	-	-	-	-	-	-	-	-	-	7140
		-	-	-	-	-	-	-	-	-	-	-	-	-	(5)
	14.Guysborough	24297	-	-	-	-	-	-	-	-	-	-	-	-	24943
		(8)	-	-	-	-	-	-	-	-	-	-	-	-	(9)
	15.Halifax	10654	107935	9296	655	624	-	-	-	-	-	-	-	-	242438
		(21)	(138)	(15)	(2)	(2)	-	-	-	-	-	-	-	-	(200)
	16.Lunenburg	637	264	45938	5573	-	-	-	-	-	-	-	-	-	35299
		(2)	(2)	(38)	(6)	-	-	-	-	-	-	-	-	-	(52)
	17.Queens	-	810	1370	15477	-	-	-	-	-	-	-	-	-	21741
		-	(3)	(4)	(9)	-	-	-	-	-	-	-	-	-	(23)
	18.Shelburne	-	-	-	-	13009	-	-	-	-	-	-	-	-	13009	
		-	-	-	-	(8)	-	-	-	-	-	-	-	-	(8)
	Newfoundland	48	-	-	-	-	-	-	-	-	-	-	-	-	48
		(1)	-	-	-	-	-	-	-	-	-	-	-	-	(1)
	P.-E.-I.	297	343	28	6	32	-	-	-	-	-	-	-	-	1969
C		(4)	(6)	(2)	(1)	(1)	-	-	-	-	-	-	-	-	(43)
A	New-Brunswick	72	9	-	-	-	-	-	-	-	-	-	-	-	348
N		(3)	(1)	-	-	-	-	-	-	-	-	-	-	-	(14)
A	Québec	271	330	114	40	24	-	-	-	-	-	-	-	-	2431
D		(9)	(13)	(6)	(2)	(1)	-	-	-	-	-	-	-	-	(88)
A	Ontario	-	-	-	-	-	-	-	-	-	-	-	-	-	64
		-	-	-	-	-	-	-	-	-	-	-	-	-	(2)
	Manitoba	-	-	-	-	-	-	-	-	-	-	-	-	-	40
		-	-	-	-	-	-	-	-	-	-	-	-	-	(1)
	Saskatchewan	153	88	8	-	-	-	-	-	-	-	-	-	-	468
		(3)	(4)	(1)	-	-	-	-	-	-	-	-	-	-	(22)
	Alberta	-	38	-	-	-	-	-	-	-	-	-	-	-	85
		-	(2)	-	-	-	-	-	-	-	-	-	-	-	(6)
	Brt.-Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	East	680	282	193	129	21	-	-	-	-	-	-	-	-	6740
U		(21)	(9)	(7)	(8)	(1)	-	-	-	-	-	-	-	-	(170)
S	Center	44	22	90	73	11	-	-	-	-	-	-	-	-	740
A		(3)	(2)	(3)	(3)	(1)	-	-	-	-	-	-	-	-	(35)
	West	-	-	14	-	-	-	-	-	-	-	-	-	-	127
		-	-	(1)	-	-	-	-	-	-	-	-	-	-	(5)
	Total Days	82781	224295	66485	24031	13831	-	-	-	-	-	-	-	-	1033273
	(Total resp.)	(130)	(215)	(90)	(35)	(15)	-	-	-	-	-	-	-	-	(1294)

Source: 1985 survey of fishing

10/15/91

FISHING BY ORIGINS/DESTINATIONS

By number of visits, all species, by unweighted values

LOC RICHARD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest 9200
Montréal, Qc, H4N 1C5

		DESTINATIONS													
ORIGINS		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Mean Days Total trips
	1.Yarmouth	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	-	1.00
		(177)	(25)	(10)	-	-	-	-	-	-	-	-	-	-	(217)
	2.Digby	1.00	1.00	1.00	-	-	-	-	-	-	-	-	1.00	-	1.00
		(10)	(203)	(3)	-	-	-	-	-	-	-	-	(1)	-	(217)
	3.Annapolis	-	1.00	1.00	-	1.00	-	-	-	-	-	-	-	-	1.00
R		-	(23)	(209)	-	(2)	-	-	-	-	-	-	-	-	(237)
O	4.Kings	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	-	1.00	1.00	1.00	-	1.00
V		(10)	(14)	(87)	(458)	(4)	-	(3)	(2)	-	(3)	(2)	(3)	-	(645)
A	5.Hants	1.00	-	1.00	1.00	1.00	-	1.00	1.00	1.00	-	-	-	1.00	1.00
		(6)	-	(2)	(24)	(399)	-	(22)	(7)	(4)	-	-	-	(1)	(718)
S	6.Cumberland	-	-	1.00	-	1.00	1.00	1.00	-	-	-	-	-	-	1.00
C		-	-	(5)	-	(10)	(458)	(41)	-	-	-	-	-	-	(306)
O	7.Colchester	-	-	-	1.00	-	1.00	1.00	1.00	-	1.00	1.00	-	1.00	1.00
T		-	-	-	(2)	-	(92)	(203)	(22)	-	(3)	(2)	-	(3)	(562)
I	8.Pictou	-	-	1.00	-	-	1.00	1.00	1.00	1.00	-	-	-	-	1.00
A		-	-	(8)	-	-	(7)	(6)	(224)	(52)	-	-	-	-	(955)
	9.Antigonish	-	-	-	-	-	1.00	-	1.00	1.00	-	-	-	-	1.00
		-	-	-	-	-	(2)	-	(2)	(81)	-	-	-	-	(121)
G	10.Inverness	-	-	-	-	-	-	-	-	-	1.00	-	1.00	1.00	1.00
		-	-	-	-	-	-	-	-	-	(164)	-	(5)	(12)	(197)
I	11.Victoria	-	-	-	-	-	-	-	-	-	-	1.00	-	-	1.00
		-	-	-	-	-	-	-	-	-	-	(48)	-	-	(53)
N	12.Cape Breton	1.00	-	-	-	-	1.00	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		(1)	-	-	-	-	(5)	-	(2)	(12)	(135)	(396)	(1127)	(102)	(1814)
S	13.Richmond	-	-	-	-	-	-	-	-	-	1.00	-	-	1.00	1.00
		-	-	-	-	-	-	-	-	-	(2)	-	-	(63)	(65)
	14.Guysborough	-	-	-	-	-	-	-	-	1.00	-	-	-	-	1.00
		-	-	-	-	-	-	-	-	(5)	-	-	-	-	(297)
	15.Halifax	1.00	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	1.00
		(2)	-	(37)	(12)	(62)	(18)	(44)	(71)	(9)	(48)	(4)	(28)	-	(2301)
	16.Lunenburg	-	-	-	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00
		-	-	-	(22)	(5)	(4)	-	-	-	-	-	-	-	(352)
	17.Queens	-	-	1.00	1.00	-	1.00	-	1.00	1.00	1.00	1.00	-	-	1.00
		-	-	(20)	(5)	-	(3)	-	(5)	(1)	(5)	(1)	-	-	(245)
	18.Shelburne	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
		-	-	-	-	-	-	-	-	-	-	-	-	-	(115)
	Newfoundland	-	-	-	-	-	-	-	-	-	-	-	-	-	8.00
		-	-	-	-	-	-	-	-	-	-	-	-	-	(1)
	P.-E.-I.	-	1.00	1.00	-	3.21	1.27	2.77	1.00	1.94	4.15	1.00	10.00	-	1.78
C		-	(1)	(2)	-	(2)	(93)	(8)	(1)	(4)	(4)	(1)	(1)	-	(152)
A	Nov-Brunswick	6.00	-	-	-	-	4.00	1.00	1.00	1.00	4.00	14.00	-	-	3.28
R		(1)	-	-	-	-	(2)	(4)	(1)	(1)	(1)	(1)	-	-	(15)
A	Québec	7.00	3.50	4.21	1.00	2.00	2.12	3.00	2.70	-	5.21	2.33	9.23	2.29	4.35
D		(1)	(2)	(1)	(1)	(1)	(3)	(2)	(2)	-	(17)	(6)	(3)	(3)	(70)
A	Ontario	-	-	-	-	-	-	-	-	-	4.00	4.00	-	-	4.00
		-	-	-	-	-	-	-	-	-	(1)	(1)	-	-	(2)
	Manitoba	-	-	-	-	5.00	-	-	-	-	-	-	-	-	5.00
		-	-	-	-	(1)	-	-	-	-	-	-	-	-	(1)
	Saskatchewan	-	-	3.50	-	-	-	3.00	3.66	1.00	4.00	-	1.50	5.14	3.85
		-	-	(1)	-	-	-	(1)	(1)	(1)	(1)	-	(2)	(1)	(15)
	Alberta	-	-	-	1.00	-	-	-	1.50	1.00	2.00	-	-	-	2.04
		-	-	-	(1)	-	-	-	(1)	(1)	(1)	-	-	-	(5)
	Brt.-Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	East	2.82	3.82	3.47	3.59	3.91	3.29	4.62	5.41	6.20	8.03	3.06	4.69	10.95	5.91
D		(4)	(3)	(2)	(3)	(2)	(10)	(15)	(2)	(2)	(47)	(2)	(2)	(1)	(131)
S	Center	3.00	-	2.00	2.00	-	-	4.74	-	3.60	3.28	2.00	1.75	1.00	3.13
A		(1)	-	(1)	(1)	-	-	(2)	-	(2)	(7)	(1)	(1)	(1)	(25)
	West	-	-	-	-	-	4.00	-	4.00	-	6.00	-	-	-	4.00
		-	-	-	-	-	(1)	-	(1)	-	(1)	-	-	-	(4)
	Mean Days (Total resp.)	1.10 (214)	1.05 (270)	1.05 (309)	1.02 (529)	1.04 (489)	1.09 (691)	1.19 (442)	1.03 (645)	1.13 (178)	2.00 (454)	1.06 (470)	1.96 (1168)	1.15 (188)	1.12 (10276)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

10/25/88

By number of visits, all species, by unweighted values

LGC McCHAUD Inc.
Economistes conseils
Logiciels experts
1490 Sauvé Ouest #200
Montréal, Qc, H4N 1C5

ORIGINS		DESTINATIONS	Reg. 14	Reg. 15	Reg. 16	Reg. 17	Reg. 18	Reg. 19	Reg. 20	Reg. 21	Reg. 22	Reg. 23	Reg. 24	Reg. 25	Reg. 26	Mean Days Total Trips
		1.Yarmouth	-	-	1.00	-	-	-	-	-	-	-	-	-	-	1.00
			-	-	(5)	-	-	-	-	-	-	-	-	-	-	(217)
		2.Digby	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
			-	-	-	-	-	-	-	-	-	-	-	-	-	(217)
		3.Annapolis	-	-	1.00	1.00	-	-	-	-	-	-	-	-	-	1.00
	H		-	-	(2)	(2)	-	-	-	-	-	-	-	-	-	(237)
	B	4.Kings	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	1.00
	V		(4)	(8)	(33)	(14)	-	-	-	-	-	-	-	-	-	(645)
	A	5.Hants	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	-	1.00
	S		(9)	(191)	(43)	-	-	-	-	-	-	-	-	-	-	(79
	C	6.Cumberland	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
	O		-	-	-	-	-	-	-	-	-	-	-	-	-	(506)
O	B	7.Colchester	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	1.00
	I		(45)	(81)	(1)	(3)	-	-	-	-	-	-	-	-	-	(342)
R	A	8.Pictou	1.00	1.00	-	-	-	-	-	-	-	-	-	-	-	1.00
			(342)	(56)	-	-	-	-	-	-	-	-	-	-	-	(996)
I		9.Antigonish	1.00	1.00	-	-	-	-	-	-	-	-	-	-	-	1.00
			(44)	(2)	-	-	-	-	-	-	-	-	-	-	-	(131)
G		10.Inverness	1.00	1.00	-	-	-	-	-	-	-	-	-	-	-	1.00
			(14)	(2)	-	-	-	-	-	-	-	-	-	-	-	(197)
I		11.Victoria	1.00	-	-	-	-	-	-	-	-	-	-	-	-	1.00
			(5)	-	-	-	-	-	-	-	-	-	-	-	-	(53)
N		12.Cape Breton	1.00	-	1.00	-	1.00	-	-	-	-	-	-	-	-	1.00
			(7)	-	(5)	-	(1)	-	-	-	-	-	-	-	-	(1814)
S		13.Richmond	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
			-	-	-	-	-	-	-	-	-	-	-	-	-	(65)
		14.Guysborough	1.00	-	-	-	-	-	-	-	-	-	-	-	-	1.00
			(292)	-	-	-	-	-	-	-	-	-	-	-	-	(297)
		15.Halifax	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	1.00
			(108)	(1765)	(96)	(67)	(15)	-	-	-	-	-	-	-	-	(2301)
		16.Lunenburg	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	1.00
			(7)	(2)	(452)	(31)	-	-	-	-	-	-	-	-	-	(552)
		17.Queens	-	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	1.00
			-	(8)	(14)	(183)	-	-	-	-	-	-	-	-	-	(245)
		18.Shelburne	-	-	-	-	1.00	-	-	-	-	-	-	-	-	1.00
			-	-	-	-	(119)	-	-	-	-	-	-	-	-	(119)
		Newfoundland	8.00	-	-	-	-	-	-	-	-	-	-	-	-	8.00
			(1)	-	-	-	-	-	-	-	-	-	-	-	-	(1)
		P.-E.-I.	2.29	2.29	2.67	1.00	4.00	-	-	-	-	-	-	-	-	1.78
	C		(10)	(10)	(1)	(1)	(1)	-	-	-	-	-	-	-	-	(152)
	A	New-Brunswick	3.33	1.00	-	-	-	-	-	-	-	-	-	-	-	3.28
	N		(3)	(1)	-	-	-	-	-	-	-	-	-	-	-	(15)
	A	Québec	7.04	4.22	4.24	2.50	3.00	-	-	-	-	-	-	-	-	4.55
	D		(5)	(9)	(4)	(2)	(1)	-	-	-	-	-	-	-	-	(70)
	A	Ontario	-	-	-	-	-	-	-	-	-	-	-	-	-	4.00
			-	-	-	-	-	-	-	-	-	-	-	-	-	(2)
		Manitoba	-	-	-	-	-	-	-	-	-	-	-	-	-	5.00
			-	-	-	-	-	-	-	-	-	-	-	-	-	(1)
		Saskatchewan	9.24	4.13	7.00	-	-	-	-	-	-	-	-	-	-	3.85
			(2)	(7)	(1)	-	-	-	-	-	-	-	-	-	-	(13)
		Alberta	-	4.00	-	-	-	-	-	-	-	-	-	-	-	2.06
			-	(1)	-	-	-	-	-	-	-	-	-	-	-	(5)
		Brt.-Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
		East	4.92	8.20	6.42	3.60	3.00	-	-	-	-	-	-	-	-	5.91
	U		(16)	(4)	(4)	(4)	(1)	-	-	-	-	-	-	-	-	(131)
	S	Center	2.93	1.75	5.60	3.27	1.00	-	-	-	-	-	-	-	-	3.13
	A		(1)	(1)	(3)	(2)	(1)	-	-	-	-	-	-	-	-	(25)
		West	-	-	2.00	-	-	-	-	-	-	-	-	-	-	4.00
			-	-	(1)	-	-	-	-	-	-	-	-	-	-	(4)
		Mean Days (Total resp.)	1.16 (917)	1.05 (2134)	1.07 (672)	1.07 (268)	1.05 (130)	- -	- -	- -	- -	- -	- -	- -	- -	1.12 (10276)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

By days of fishing, all species, by household weighting

10/26/88

LUC RICHAUD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest #200
Montréal. Qc, H4R 1C5

ORIGINS		DESTINATIONS													
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Total Days Total Resp.
	1.St-Johns	30913	9328	24677	546281	34391	3448	-	-	-	-	-	-	-	657037
		(27)	(10)	(17)	(207)	(42)	(5)	-	-	-	-	-	-	-	(308)
R	2.Gander	152547	7995	4156	2681	81664	375	-	-	-	-	-	-	-	250619
E		(66)	(11)	(1)	(1)	(39)	(2)	-	-	-	-	-	-	-	(121)
L	3.Hooker	125162	112033	-	933	542	622	-	-	-	-	-	-	-	249292
A		(62)	(43)	-	(1)	(2)	(2)	-	-	-	-	-	-	-	(110)
T	4.Bonavista	5547	2099	2589	203086	133524	-	-	-	-	-	-	-	-	346845
I		(8)	(5)	(3)	(79)	(49)	-	-	-	-	-	-	-	-	(144)
O	5.Grandfalls	124026	25073	-	5139	10783	67580	-	-	-	-	-	-	-	242607
N		(60)	(12)	-	(2)	(5)	(27)	-	-	-	-	-	-	-	(106)
	6.Burin	4898	94580	89126	2250	25857	-	-	-	-	-	-	-	-	216712
		(3)	(44)	(38)	(3)	(11)	-	-	-	-	-	-	-	-	(99)
	P.-E.-I.	76	12	-	44	-	32	-	-	-	-	-	-	-	164
		(2)	(1)	-	(1)	-	(1)	-	-	-	-	-	-	-	(5)
	Nova Scotia	3109	1542	200	56	250	565	-	-	-	-	-	-	-	5750
C		(78)	(48)	(7)	(2)	(8)	(17)	-	-	-	-	-	-	-	(162)
A	New-Brunswick	326	211	-	50	25	510	-	-	-	-	-	-	-	1129
N		(12)	(6)	-	(3)	(1)	(13)	-	-	-	-	-	-	-	(35)
A	Quebec	330	225	-	48	69	3029	-	-	-	-	-	-	-	3702
D		(10)	(6)	-	(3)	(2)	(45)	-	-	-	-	-	-	-	(66)
A	Ontario	1121	564	116	134	504	1150	-	-	-	-	-	-	-	3595
		(34)	(18)	(1)	(4)	(19)	(26)	-	-	-	-	-	-	-	(102)
	Manitoba	50	33	-	-	50	25	-	-	-	-	-	-	-	174
		(1)	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	(4)
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	9	-	-	8	-	-	-	-	-	-	-	-	-	17
		(1)	-	-	(1)	-	-	-	-	-	-	-	-	-	(2)
	Brt.-Columbia	-	-	-	-	17	-	-	-	-	-	-	-	-	17
		-	-	-	-	(1)	-	-	-	-	-	-	-	-	(1)
	East	2102	1333	118	486	534	3922	-	-	-	-	-	-	-	8496
U		(43)	(21)	(1)	(11)	(14)	(77)	-	-	-	-	-	-	-	(167)
S	Center	133	73	24	17	198	842	-	-	-	-	-	-	-	1196
A		(4)	(2)	(1)	(1)	(3)	(17)	-	-	-	-	-	-	-	(28)
	West	118	-	-	-	71	201	-	-	-	-	-	-	-	391
		(4)	-	-	-	(1)	(5)	-	-	-	-	-	-	-	(10)
	Total Days	469474	265103	121085	761214	288405	82456	-	-	-	-	-	-	-	1987736
	(Total resp.)	(415)	(228)	(69)	(321)	(159)	(229)	-	-	-	-	-	-	-	(1470)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS

10/26/88

By number of visits, all species, by unweighted values

LUC RICHAUD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest 1200
Montréal. Qc, H4N 1C5

		DESTINATIONS													
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Mean Days Total Trips
	1.St-Johns	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00
		(242)	(66)	(176)	(4254)	(293)	(371	-	-	-	-	-	-	-	(5068)
N	2.Gander	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00
F		(1422)	(68)	(311)	(201	(785)	(61	-	-	-	-	-	-	-	(2332)
L	3.Hunber	1.00	1.00	-	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00
D		(1124)	(841)	-	(61	(61	(41	-	-	-	-	-	-	-	(1981)
D	4.Bonavista	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	1.00
		(47)	(201	(221	(1616)	(1057)	-	-	-	-	-	-	-	-	(2762)
	5.Grandfalls	1.00	1.00	-	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00
		(1000)	(255)	-	(36)	(72)	(550)	-	-	-	-	-	-	-	(2093)
	6.Corner	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	1.00
		(37)	(1110)	(254)	(12)	(157)	-	-	-	-	-	-	-	-	(2075)
	P.-E.-I.	2.00	2.00	-	2.00	-	5.00	-	-	-	-	-	-	-	5.52
		(1)	(1)	-	(1)	-	(1)	-	-	-	-	-	-	-	(4)
	Nova Scotia	5.76	5.37	5.57	4.31	7.19	4.97	-	-	-	-	-	-	-	5.58
C		(72)	(42)	(7)	(2)	(51	(151	-	-	-	-	-	-	-	(144)
A	New-Brunswick	4.24	4.29	-	2.45	2.00	4.77	-	-	-	-	-	-	-	4.22
N		(11)	(7)	-	(3)	(1)	(12)	-	-	-	-	-	-	-	(36)
A	Quebec	4.75	3.78	-	3.17	5.50	2.71	-	-	-	-	-	-	-	2.92
D		(8)	(7)	-	(1)	(2)	(133)	-	-	-	-	-	-	-	(152)
A	Ontario	6.05	6.62	14.00	6.67	6.63	6.18	-	-	-	-	-	-	-	6.38
		(29)	(12)	(1)	(3)	(13)	(25)	-	-	-	-	-	-	-	(88)
	Manitoba	7.00	4.00	-	-	7.00	4.00	-	-	-	-	-	-	-	5.50
		(1)	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	(4)
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	1.00	-	-	1.00	-	-	-	-	-	-	-	-	-	1.00
		(1)	-	-	(1)	-	-	-	-	-	-	-	-	-	(2)
	Brt.-Columbia	-	-	-	-	2.00	-	-	-	-	-	-	-	-	2.00
		-	-	-	-	(1)	-	-	-	-	-	-	-	-	(1)
	East	7.60	10.27	15.00	6.94	6.62	6.53	-	-	-	-	-	-	-	7.27
U		(35)	(15)	(1)	(8)	(10)	(77)	-	-	-	-	-	-	-	(148)
S	Center	5.87	7.67	3.00	2.00	12.17	6.40	-	-	-	-	-	-	-	6.54
A		(3)	(1)	(1)	(1)	(2)	(16)	-	-	-	-	-	-	-	(24)
	West	2.75	-	-	-	5.00	5.00	-	-	-	-	-	-	-	4.90
		(4)	-	-	-	(1)	(5)	-	-	-	-	-	-	-	(10)
	Mean Days (Total resp.)	1.20	1.18	1.06	1.02	1.09	2.16	-	-	-	-	-	-	-	1.16
		(4115)	(2548)	(993)	(5971)	(2406)	(887)	-	-	-	-	-	-	-	(16926)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS (P. E. I.)

By days of fishing, all species, by household weighting

LUC RICHARD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest #200
Montréal. Qc, H4N 1C5

ORIGINS		DESTINATIONS													
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Total Days Total Resp.
CANADA	Newfoundland	-	17	-	-	-	6	-	-	-	-	-	-	-	23
		-	(1)	-	-	-	(1)	-	-	-	-	-	-	-	(2)
	P.-E.-I.	28296	24600	29139	33841	58552	25638	-	-	-	-	-	-	-	192106
		(78)	(100)	(78)	(87)	(145)	(74)	-	-	-	-	-	-	-	(562)
	Nova Scotia	164	244	317	198	171	79	-	-	-	-	-	-	-	1174
		(6)	(9)	(9)	(8)	(6)	(6)	-	-	-	-	-	-	-	(44)
	New-Brunswick	96	136	68	130	269	74	-	-	-	-	-	-	-	773
		(6)	(7)	(4)	(7)	(14)	(4)	-	-	-	-	-	-	-	(42)
	Quebec	11	123	17	28	51	-	-	-	-	-	-	-	-	231
		(1)	(8)	(2)	(3)	(1)	-	-	-	-	-	-	-	-	(15)
	Ontario	289	181	282	561	156	272	-	-	-	-	-	-	-	1743
		(91)	(15)	(12)	(11)	(10)	(12)	-	-	-	-	-	-	-	(69)
	Manitoba	-	11	-	-	-	11	-	-	-	-	-	-	-	23
		-	(1)	-	-	-	(2)	-	-	-	-	-	-	-	(3)
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	-	-	-	17	-	-	-	-	-	-	-	-	-	17
		-	-	-	(2)	-	-	-	-	-	-	-	-	-	(2)
	Brt.-Columbia	-	28	-	-	17	-	-	-	-	-	-	-	-	45
		-	(1)	-	-	(1)	-	-	-	-	-	-	-	-	(2)
USA	East	151	263	379	216	259	165	-	-	-	-	-	-	-	1632
		(6)	(11)	(12)	(8)	(12)	(5)	-	-	-	-	-	-	-	(55)
	Center	-	14	14	-	7	72	-	-	-	-	-	-	-	100
		-	(1)	(1)	-	(1)	(1)	-	-	-	-	-	-	-	(4)
	West	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total Days (Total resp.)	29008 (106)	25618 (154)	30417 (118)	34992 (126)	51522 (191)	26318 (105)	-	-	-	-	-	-	-	197875 (800)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS (P. E. I.)

By number of visits, all species, by unweighted values

LUC RICHAUD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest 9200
Montréal, Qc, H4N 1C5

		DESTINATIONS													
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Mean Days Total Trips
CANADA	Newfoundland	-	3.00	-	-	-	1.00	-	-	-	-	-	-	-	2.00
		-	(1)	-	-	-	(1)	-	-	-	-	-	-	-	(2)
	P.-E.-I.	1.00	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00
		(1059)	(923)	(1097)	(1275)	(1087)	(951)	-	-	-	-	-	-	-	(7192)
	Nova Scotia	2.50	2.17	3.29	2.97	2.50	3.06	-	-	-	-	-	-	-	2.71
		(11)	(19)	(17)	(11)	(11)	(4)	-	-	-	-	-	-	-	(76)
	New-Brunswick	3.64	4.14	2.23	2.26	2.98	2.09	-	-	-	-	-	-	-	2.83
		(4)	(5)	(5)	(10)	(15)	(6)	-	-	-	-	-	-	-	(48)
	Quebec	2.00	2.06	2.00	2.00	9.00	-	-	-	-	-	-	-	-	3.20
		(1)	(7)	(1)	(1)	(1)	-	-	-	-	-	-	-	-	(12)
	Ontario	9.92	3.06	5.24	11.53	3.60	5.28	-	-	-	-	-	-	-	6.12
		(5)	(10)	(9)	(8)	(7)	(9)	-	-	-	-	-	-	-	(56)
	Manitoba	-	2.00	-	-	-	1.00	-	-	-	-	-	-	-	1.33
		-	(1)	-	-	-	(2)	-	-	-	-	-	-	-	(3)
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	-	-	-	1.50	-	-	-	-	-	-	-	-	-	1.50
		-	-	-	(2)	-	-	-	-	-	-	-	-	-	(2)
	Brt.-Columbia	-	5.00	-	-	3.00	-	-	-	-	-	-	-	-	4.00
		-	(1)	-	-	(1)	-	-	-	-	-	-	-	-	(2)
USA	East	3.53	5.06	7.20	7.15	3.16	6.86	-	-	-	-	-	-	-	5.24
		(5)	(6)	(10)	(4)	(11)	(3)	-	-	-	-	-	-	-	(42)
	Center	-	2.00	2.00	-	1.00	10.00	-	-	-	-	-	-	-	3.75
		-	(1)	(1)	-	(1)	(1)	-	-	-	-	-	-	-	(4)
	West	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mean Days (Total resp.)	1.08	1.11	1.14	1.12	1.05	1.08	-	-	-	-	-	-	-	1.09
		(1086)	(977)	(1142)	(1313)	(1935)	(978)	-	-	-	-	-	-	-	(7433)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS (New Brunswick)

By days of fishing, all species, by household weighting

10/25/88

LUC RICHARD Inc.
Economistes conseils
Logiciels experts
1400 Sauvé Ouest 1200
Montréal, Qc, H4N 1C5

		DESTINATIONS													
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Total Days Total Resp.
	Newfoundland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	P.-E.-I.	-	285	-	-	-	-	-	-	-	-	-	-	-	-
		-	(3)	-	-		-	-	82	-	-	-	-	-	368
	Nova Scotia	375	1468	696	101		-	-	(2)	-	-	-	-	-	(5)
C		(6)	(23)	(10)	(2)		-	-	62	-	62	74	-	-	2750
A	New-Brunswick	478294	281013	59729	36083	41273	58878	118844	106624	81230	42500	73000	-	882	1379885
B		(12000)	(10500)	(2130)	(775	(1291	(1411	(2151	(3071	(1541	(911	(1821	-	(61	(38551
A	Quebec	702	1225	271	-	160	-	-	-	300	37	-	-	-	2784
D		(15)	(21)	(9)	-	(2)	-	-	-	(3)	(2)	-	-	-	(52)
A	Ontario	1917	1356	225	45	97	41	31	58	-	222	21	-	-	4804
		(31)	(21)	(6)	(2)	(5)	(1)	(1)	(1)	-	(4)	(1)	-	-	(84)
	Manitoba	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	206	-	-	-	-	-	-	-	-	-	-	-	-	206
		(2)	-	-	-	-	-	-	-	-	-	-	-	-	(2)
	Brt.-Columbia	-	-	109	-	-	-	-	-	-	-	-	-	-	108
		-	-	(1)	-	-	-	-	-	-	-	-	-	-	(1)
	East	7993	16517	2599	3747	79	-	225	1552	381	-	585	-	16	35311
O		(131)	(199)	(30)	(68)	(2)	-	(6)	(17)	(5)	-	(6)	-	(1)	(473)
S	Center	359	649	152	109	62	41	-	-	-	-	-	-	-	1812
A		(3)	(11)	(2)	(1)	(1)	(1)	-	-	-	-	-	-	-	(21)
	West	-	284	85	62	-	-	-	-	-	-	-	-	-	391
		-	(3)	(1)	(2)	-	-	-	-	-	-	-	-	-	(6)
	Total Days (Total resp.)	489846 (14700)	302397 (13411)	63682 (2861	42070 (155.	41670 (1499)	58950 (1431)	119210 (2221)	108370 (3301)	82007 (1621)	42829 (981)	74479 (1911)	-	898 (71)	1426419 (45461)

Source: 1985 survey of fishing

FISHING BY ORIGINS/DESTINATIONS (New Brunswick)

By number of visits, all species, by unweighted values

10/26/88

LUC RICHAUD Inc.
Economistes conseils
Logiciels experts
1490 Sauvé Ouest H3H
Montréal, Qc, H4N 1C5

		DESTINATIONS													
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Mean Days Total Trips
	Newfoundland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	P.-E.-I.	-	4.11	-	-	-	-	-	-	-	-	-	-	-	-
		-	(9)	-	-	-	-	-	4.00	-	-	-	-	-	-
	Nova Scotia	4.63	3.42	4.17	2.43	-	-	-	(1)	-	-	-	-	-	4.10
C		(6)	(32)	(12)	(2)	-	-	-	1.50	-	3.00	2.33	-	-	(10)
A	New-Brunswick	1.00	1.00	1.00	1.00	1.00	1.00	1.00	(2)	-	(1)	(2)	-	-	3.56
N		(87711)	(77221)	(12230)	(490)	(1101)	(816)	(1831)	1.00	1.00	1.00	1.00	-	-	(59)
A	Quebec	1.49	6.30	2.55	-	3.67	-	-	(1500)	(1254)	(657)	(1094)	-	1.00	1.00
D		(39)	(24)	(5)	-	(3)	-	-	-	12.00	1.33	-	-	(14)	(26580)
A	Ontario	5.65	4.58	6.21	2.65	4.58	2.00	2.00	3.00	(2)	(1)	-	-	-	3.84
		(22)	(22)	(3)	(1)	(1)	(1)	(1)	(1)	-	6.45	1.00	-	-	(67)
	Manitoba	-	-	-	-	-	-	-	-	-	(2)	(1)	-	-	4.85
		-	-	-	-	-	-	-	-	-	-	-	-	-	(57)
	Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alberta	2.50	-	-	-	-	-	-	-	-	-	-	-	-	-
		(4)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Brt.-Columbia	-	-	2.00	-	-	-	-	-	-	-	-	-	-	2.50
		-	-	(1)	-	-	-	-	-	-	-	-	-	-	(4)
	East	2.12	5.37	3.70	2.03	2.50	-	-	-	-	-	-	-	-	7.00
U		(262)	(201)	(46)	(178)	(2)	-	1.57	1.01	5.20	-	13.49	-	1.00	(1)
S	Center	4.00	3.91	5.00	7.00	3.00	2.00	(14)	(58)	(5)	-	(3)	-	(1)	3.29
A		(5)	(11)	(4)	(1)	(1)	(1)	-	-	-	-	-	-	-	(851)
	West	-	6.50	7.00	4.00	-	-	-	-	-	-	-	-	-	3.78
		-	(2)	(1)	(1)	-	-	-	-	-	-	-	-	-	(23)
															6.00
															(4)
	Mean Days (Total resp.)	1.05 (9101)	1.19 (8104)	1.16 (1303)	1.30 (674)	1.02 (1108)	1.00 (818)	1.00 (1845)	1.03 (1552)	1.02 (1361)	1.02 (661)	1.04 (1100)	- -	1.00 (15)	1.09 (27657)

Source: 1985 survey of fishing

APPENDIX 4

DATA OBTAINED AND DERIVED FROM THE SURVEY, 1985

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
QUEBEC	GASPESIE	185216	25223	532547	1.00	$52.23	275	183	0		2875.275
	SAGUENAY	321172	28891	7145	6.00	$111.39	457	395	0	1.5	3.709
REGION A	QUEBEC	831248	29653	118023	8.26	$130.55	640	435	0		17.189
	TROIS-RIV.	356275	25526	12113	6.29	$155.51	820	537	0		5.405
	EAST.TOWN	189589	26388	29408	16.60	$169.53	885	576	0		9.344
	MONTREAL	2985100	32304	117906	4.18	$187.88	905	589	0		9.449
	OUTAOUAIS	220746	30497	10172	3.39	$223.33	1110	711	0		13.593
	ABIT.-TEM.	117783	29578	1785	3.64	$308.97	1520	1027	0		4.163
	C-NORD-NV.-Q.	99381	33276	9770	4.33	$129.35	200	630	0	3	22.704
	P.-E.-I.	126646	25457	50	2.52	$147.73	775	516	0		0.157
	NOVA-SCOTIA	873199	27273	60	3.68	$167.50	875	550	0		0.019
	NEW-BRUNSWICK	696403	25106	508	3.43	$146.98	775	516	0		0.213
	ONTARIO	9113515	32001	1787	2.45	$297.14	1435	919	0		0.080
	US-EAST	90042000	53692	3469	4.93	$507.22	905	709	120		0.009
	US-CENTER	98262000	47990	189	4.54	$536.37	905	739	140		0.000
	US-WEST	47302000	54270	105	6.13	$816.41	905	919	250		0.000
QUEBEC	GASPESIE	185216	25223	161942	1.00	$43.53	220	163	0		874.341
	SAGUENAY	321172	28891	3578	3.00	$61.76	210	204	0	2	3.713
REGION B	QUEBEC	831248	29653	513614	1.00	$67.15	330	223	0		617.883
	TROIS-RIV.	356275	25526	2405	1.60	$61.34	325	210	0		4.219
	EAST.TOWN	189589	26388	25886	14.13	$83.27	430	288	0		9.563
	MONTREAL	2985100	32304	73067	5.20	$84.33	410	261	0		4.707
	OUTAOUAIS	220746	30497	4497	7.33	$122.60	615	384	0		2.779
	ABIT.-TEM.	117783	29578	2019	6.40	$206.93	1025	681	0		2.673
	C-NORD-NV.-Q.	99381	33276	8832	4.07	$99.72	250	373	0	3	21.835
	P.-E.-I.	126646	25457	47	1.93	$188.95	1000	650	0		0.192
	NOVA-SCOTIA	873199	27273	57	2.32	$190.46	1000	620	0		0.023
	NEW-BRUNSWICK	710422	25106	482	3.35	$151.44	800	530	0		0.203
	ONTARIO	9113515	32001	1695	2.39	$194.00	960	591	0		0.078
	US-EAST	90042000	53692	3291	4.80	$374.44	410	381	120		0.008
	US-CENTER	98262000	53692	180	4.43	$421.15	410	411	140		0.000
	US-WEST	47302000	54270	100	3.87	$682.84	410	591	250		0.001
QUEBEC	GASPESIE	185216	25223	862	4.00	$166.74	885	576	0		1.164
	QUEBEC	831248	29653	268112	9.06	$34.49	170	114	0		35.601
REGION C	TROIS-RIV.	356275	25526	144140	11.05	$25.23	135	83	0		36.613
	EAST.TOWN.	189589	26388	522952	1.00	$36.15	195	116	0		2739.346
	MONTREAL	2985100	32304	677489	6.92	$42.53	127	205	0		32.707
	C-NORD-NV.-Q.	99381	33276	161	1.00	$153.28	670	504	0	0.5	1.620
	NEW-BRUNSWICK	710422	25106	162	4.20	$184.34	980	638	0		0.054
	ONTARIO	9113515	32001	10394	3.41	$151.54	755	457	0		0.334
	US-EAST	90042000	53692	6141	6.13	$319.86	205	247	120		0.011
	US-CENTER	98262000	47990	452	5.26	$359.99	205	277	140		0.001
	US-WEST	47302000	54270	90	2.75	$627.94	205	457	250		0.001
QUEBEC	GASPESIE	185216	25223	3408	6.00	$125.31	665	433	0		3.067
	QUEBEC	831248	29653	27157	3.68	$33.13	170	103	0		8.878
REGION D	TROIS-RIV.	356275	25526	360849	1.00	$7.57	40	26	0		1012.839

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Days	Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	TROIS-RIV.	356275	25526	326613	1.00	$19.42	90	81	0		916.744
	EAST.TOWN	189589	26388	19709	5.14	$80.22	390	304	0		20.225
	MONTREAL	2985100	32304	1119701	5.20	$50.95	235	169	0		72.134
	OUTAOUAIS	220746	30497	115001	1.00	$60.28	280	210	0		520.965
	ABIT.-TEM.	117783	29578	615	1.33	$75.74	360	264	0		3.926
	C-NORD-NV.-Q.	99381	33276	96	1.00	$190.28	852	635	0		0.966
	ONTARIO	9113515	32001	5673	5.14	$160.74	785	499	0		0.121
	ALBERTA	2375278	36796	97	1.49	$439.53	235	400	175		0.027
	US-EAST	90042000	53692	5356	7.57	$332.85	235	289	120		0.008
	US-CENTER	98262000	47990	1698	9.51	$371.99	235	319	140		0.002
	US-WEST	47302000	54270	115	1.24	$641.04	235	499	250		0.002
QUEBEC	GASPESIE	185216	25223	2660	3.00	$117.97	610	426	0		4.787
	SAGUENAY	321172	28891	27670	1.00	$37.97	180	136	0		86.153
REGION I	QUEBEC	831248	29653	825644	1.00	$25.54	115	95	0		993.258
	TROIS-RIV.	356275	25526	94829	4.33	$39.32	200	144	0		61.471
	EAST.TOWN	189589	26388	4010	2.85	$57.22	300	193	0		7.421
	MONTREAL	2985100	32304	216951	3.88	$75.43	365	235	0		18.731
	OUTAOUAIS	220746	30497	4886	4.00	$130.24	630	430	0		5.534
	ABIT.-TEM.	117783	29578	4432	5.50	$199.54	985	660	0		6.842
	C-NORD-NV.-Q.	99381	33276	7557	1.96	$133.83	630	420	0		38.796
	ONTARIO	9113515	32001	4176	3.64	$185.14	915	565	0		0.126
	ALBERTA	2375278	36497	72	1.04	$466.03	365	475	175		0.029
	US-EAST	90042000	53692	3943	5.36	$363.22	365	355	120		0.008
	US-CENTER	98262000	47990	1250	6.74	$400.78	365	385	140		0.002
	US-WEST	47302000	54270	84	0.87	$671.56	365	565	250		0.002
QUEBEC	GASPESIE	185216	25223	669	1.00	$290.33	1520	1027	0		3.612
	SAGUENAY	321172	28891	4249	2.60	$87.61	380	349	0		5.088
REGION J	QUEBEC	831248	29653	10857	2.44	$92.23	400	358	0		5.353
	TROIS-RIV.	356275	25526	47291	4.95	$69.32	310	302	0		26.816
	EAST.TOWN	189589	26388	12303	3.50	$145.96	760	498	0		18.541
	MONTREAL	2985100	32304	343225	5.38	$132.75	615	438	0		21.372
	OUTAOUAIS	220746	30497	166266	4.19	$90.68	420	317	0		179.761
	ABIT.-TEM.	117783	29578	582388	1.00	$47.05	200	187	0		4944.585
	C-NORD-NV.-Q.	99381	33276	8515	9.29	$303.42	1370	981	0	0.5	9.223
	NOVA-SCOTIA	873199	27273	166	3.06	$383.80	615	528	125		0.062
	ONTARIO	9113515	32001	125762	3.53	$242.20	1165	768	0		3.909
	US-EAST	90042000	53692	35630	5.03	$438.63	615	558	120		0.079
	US-CENTER	98262000	47990	17031	7.49	$471.38	615	588	140		0.023
	US-WEST	47302000	54270	385	6.51	$747.46	615	768	250		0.001
QUEBEC	GASPESIE	185216	25223	9715	3.18	$64.98	270	310	0		16.494
	SAGUENAY	321172	28891	997866	1.00	$48.19	225	176	0		3106.952
REGION K	QUEBEC	831248	29653	281514	3.43	$87.62	412	309	0		98.736
	TROIS-RIV.	356275	25526	55813	5.52	$101.97	550	310	0	0.5	28.380
	EAST.TOWN	189589	26388	24613	4.02	$121.84	625	426	0		32.294
	MONTREAL	2985100	32304	187654	4.41	$121.70	570	396	0		14.255

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	CENTRAL	5069941	35250	62150	1.24	$360.84	1690	1076	0		2.898
	SOUTH WEST	1872507	29882	9162	1.24	$382.16	1895	1243	0		1.157
	MANITOBA	1071232	31262	312299	2.59	$83.17	400	270	0		112.561
	SASKATCHEWAN	1010198	30786	3199	2.80	$283.10	140	205	120		1.131
	ALBERTA	2375278	36796	5485	6.00	$749.97	1690	1286	175		0.385
	BRT.-COLUMBIA	2889207	33497	1142	3.33	$794.85	1690	1376	200		0.119
	US-EAST	90042000	53692	50171	6.42	$713.65	1690	1166	125		0.087
	US-CENTER	98262000	47990	1298764	4.76	$741.95	1690	1196	150		2.777
	US-WEST	47302000	54270	30333	9.69	$1 020.73	1690	1406	250		0.066
ONTARIO	N.-WEST	55480	29355	3280	1.24	$126.37	625	420	0		59.120
	N.-CENTRAL	175270	33782	987340	1.24	$43.00	200	135	0		5633.252
REGION 2	NORTH	179118	29115	7789	1.24	$141.02	700	470	0		43.485
	N.-EAST	395226	30724	7340	1.24	$189.13	920	615	0		18.572
	ALGONQUIN	205850	25709	9353	1.24	$220.05	1150	766	0		9.667
	EASTERN	1159895	32078	17603	1.24	$292.70	1400	933	0		3.229
	CENTRAL	5069941	35250	91235	1.24	$264.50	1225	800	0		3.829
	SOUTH WEST	1872507	29882	8591	1.24	$285.69	1420	926	0		0.976
	QUEBEC	6540270	30643	1485	1.00	$328.11	1600	1066	0		0.227
	MANITOBA	1071232	31262	5027	3.61	$171.03	825	553	0		1.300
	ALBERTA	2375278	36796	1256	5.50	$651.85	1225	1010	175		0.096
	BRT.-COLUMBIA	2998207	33497	114	1.00	$700.53	1225	1100	200		0.038
	US-EAST	90042000	53692	27003	7.21	$596.11	1225	890	125		0.042
	US-CENTER	98262000	47990	436052	4.71	$630.96	1225	920	150		0.942
	US-WEST	47302000	54270	10171	3.50	$902.52	1225	1130	250		0.061
ONTARIO	N.-WEST	55480	29355	477	1.24	$262.47	1300	870.5	0		8.598
	N.-CENTRAL	175270	33782	2881	1.24	$175.82	820	550	0		16.437
REGION 3	NORTH	179118	29115	713061	1.24	$38.57	190	130	0		3980.957
	N.-EAST	395226	30724	132779	1.24	$20.71	100	68	0		335.957
	ALGONQUIN	205850	25709	24764	1.24	$87.06	455	303	0		20.459
	EASTERN	1159895	32078	49944	1.24	$152.56	730	486	0		7.323
	CENTRAL	5069941	35250	185092	1.24	$133.75	625	400	0		6.239
	SOUTH WEST	1872507	29882	51440	1.24	$165.96	830	533	0		4.672
	QUEBEC	6540270	30643	5027	2.22	$190.63	930	619	0		0.346
	US-EAST	90042000	53692	76488	6.07	$434.62	625	490	125		0.140
	US-CENTER	98262000	47990	167616	5.98	$478.98	625	520	150		0.285
	US-WEST	47302000	54270	1702	27.33	$740.07	625	730	250		0.001
ONTARIO	N.-CENTRAL	175270	33782	29505	1.24	$199.82	1020	550	0		168.340
	NORTH	179118	29115	19050	1.24	$80.75	400	270	0		106.354
REGION 4	N.-EAST	395226	30724	2698063	1.24	$20.71	100	68	0		6826.633
	ALGONQUIN	205850	25709	116482	1.24	$33.43	175	116	0		565.859
	EASTERN	1159895	32078	38044	1.24	$102.37	490	326	0		5.316
	CENTRAL	5069941	35250	925120	1.24	$73.73	350	216	0		29.574
	SOUTH WEST	1872507	29882	228806	1.24	$109.08	550	346	0		19.804
	NEW-BRUNSWICK	710422	25106	571	5.00	$477.15	350	336	200		0.161
	QUEBEC	6540270	30643	5370	3.27	$141.40	690	459	0		0.251

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Days	Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	OUTAOUAIS	220746	30497	1975	1.75	$157.55	775	508	0		5.113
	ABIT.-TEM.	117783	29578	6266	11.50	$87.52	412	309	0		4.626
	C-NORD-NV.-Q.	99381	33276	267789	1.00	$89.13	410	288	0		2694.569
	ONTARIO	9113515	32001	6441	3.23	$231.20	1120	726	0		0.219
	ALBERTA	2375278	36796	111	2.66	$515.91	570	636	175		0.018
	US-EAST	90042000	53692	6081	4.76	$423.84	570	516	120		0.014
	US-CENTER	98262000	47990	1928	5.98	$457.58	570	546	140		0.003
	US-WEST	47302000	54270	130	2.89	$732.57	570	726	250		0.001
QUEBEC	GASPESIE	185216	25223	5075	4.40	$94.84	290	400	0	3	6.227
	SAGUENAY	321172	28891	13118	5.00	$272.19	20	73	130.5		8.169
REGION L	QUEBEC	831248	29653	27773	3.18	$466.09	425	543	174		10.507
	EAST.TOWN	189589	26388	8366	9.46	$521.34	665	687	174	3	4.665
	MONTREAL	2985100	32304	29174	3.30	$546.24	905	666	174		2.962
	ABIT.-TEM.	117783	29578	213	1.00	$94.77	420	360	0		1.808
	C-NORD-NV.-Q.	99381	33276	189787	1.00	$407.91	230	233	174		1909.691
	NEW-FOUNDLAND	568349	23384	188	1.17	$455.17	230	283	200		0.283
	NOVA-SCOTIA	873199	27273	361	2.97	$794.51	905	756	300		0.139
	NEW-BRUNSWICK	710422	25106	492	2.66	$661.39	230	323	300		0.260
	ONTARIO	9113515	32001	10089	2.63	$307.40	1455	996	0		0.421
	US-EAST	90042000	53692	25626	4.07	$872.44	905	786	294		0.070
	US-CENTER	98262000	47990	4444	3.81	$899.77	905	816	314		0.012
	US-WEST	47302000	54270	825	5.44	$1 181.82	905	996	424		0.003
QUEBEC	GASPESIE	185216	25223	6266	1.44	$1 260.79	325	607	579		23.494
	SAGUENAY	321172	28891	70436	7.21	$63.47	245	283	0		30.417
REGION M	QUEBEC	831248	29653	24939	5.38	$117.06	505	457	0		5.577
	TROIS-RIV.	356275	25526	1325	2.00	$112.99	525	470	0		1.860
	EAST.TOWN	189589	26388	4001	4.47	$146.51	695	574	0		4.721
	MONTREAL	2985100	32304	80700	11.08	$552.48	865	748	174		2.440
	OUTAOUAIS	220746	30497	5305	6.75	$487.14	630	500	174		3.560
	ABIT.-TEM.	117783	29578	67701	4.94	$398.00	200	211	174		116.355
	C-NORD-NV.-Q.	99381	33276	4496	9.67	$1 247.12	0	210	609		4.678
	NEW-FOUNDLAND	568349	23384	182	1.93	$632.15	0	330	300		0.166
	NOVA-SCOTIA	873199	27273	350	6.55	$799.03	865	838	300		0.061
	NEW-BRUNSWICK	710422	25106	477	7.32	$631.38	0	300	300		0.092
	ONTARIO	9113515	32001	9781	11.95	$313.54	1415	1078	0		0.090
	US-EAST	90042000	53692	24845	18.52	$685.99	865	868	194		0.015
	US-CENTER	98262000	47990	4308	17.32	$711.36	865	898	214		0.003
	US-WEST	47302000	54270	800	13.48	$1 255.56	865	1078	454		0.001
ONTARIO	N.-WEST	55480	29355	574389	1.24	$40.82	200	137.5	0		10353.082
	N.-CENTRAL	175270	33782	68046	1.24	$90.23	420	283	0		388.235
REGION 1	NORTH	179118	29115	115	1.24	$239.49	1190	797	0		0.642
	N.-EAST	395226	30724	17668	1.24	$280.30	1365	910	0		10.568
	ALGONQUIN	205850	25709	6076	1.24	$290.91	1520	1013	0		6.978
	EASTERN	1159895	32078	11883	1.24	$383.66	1835	1223	0		2.422

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residance Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	MANITOBA	1071232	31262	1828	3.43	$351.97	1700	1136	0		0.498
	US-EAST	90042000	53692	139089	6.91	$360.46	350	306	125		0.224
	US-CENTER	98262000	47990	535435	5.97	$409.19	350	336	150		0.913
	US-WEST	47302000	54270	4970	16.83	$617.98	350	336	250		0.006
ONTARIO	N.-WEST	55480	29355	4489	1.24	$343.07	1700	1137	0		11.609
	N.-CENTRAL	175270	33782	1106	1.24	$261.40	1220	817	0		0.905
REGION 5	NORTH	179118	29115	6727	1.24	$101.85	505	340	0		5.388
	N.-EAST	395226	30724	38561	1.24	$36.11	175	118	0		97.567
	ALGONQUIN	205850	25709	1460861	1.24	$32.72	170	115	0		7096.726
	EASTERN	1159895	32078	429612	1.24	$73.14	350	233	0		370.389
	CENTRAL	5069941	35250	2669306	1.24	$68.38	325	200	0		526.496
	SOUTH WEST	1872507	29882	247344	1.24	$98.97	500	313	0		18.952
	QUEBEC	6540270	30643	3199	2.68	$112.73	550	366	0		0.183
	MANITOBA	1071232	31262	2171	5.12	$393.43	1900	1270	0		0.396
	ALBERTA	2375278	36796	1142	5.00	$451.86	325	410	175		0.096
	US-EAST	90042000	53692	168810	6.55	$353.88	325	290	125		0.286
	US-CENTER	98262000	47990	169367	7.87	$402.99	325	320	150		0.219
	US-WEST	47302000	54270	3453	4.80	$658.85	325	530	250		0.017
ONTARIO	NORTH	179118	29115	230	1.24	$157.65	785	523	0		0.384
	N.-EAST	395226	30724	10722	1.24	$111.87	545	363	0		8.122
REGION 6	ALGONQUIN	205850	25709	54207	1.24	$92.80	485	323	0		263.333
	EASTERN	1159895	32078	3093349	1.24	$20.82	100	66	0		2666.922
	CENTRAL	5069941	35250	994245	1.24	$81.61	390	237	0		196.106
	SOUTH WEST	1872507	29882	27881	1.24	$117.57	600	366	0		4.458
	NOVA-SCOTIA	873199	27273	114	1.00	$340.10	140	205	150		0.039
	QUEBEC	6540270	30643	39652	1.78	$61.41	300	199	0		3.406
	MANITOBA	1071232	31262	685	3.00	$454.96	2200	1466	0		0.213
	US-EAST	90042000	53692	797600	3.16	$369.96	390	327	125		2.803
	US-CENTER	98262000	47990	135908	7.67	$416.19	390	347	150		0.180
	US-WEST	47302000	54270	2931	4.33	$675.01	390	567	250		0.014
	NORTH	179118	29115	2499	2.25	$70.27	350	233	0		6.201
ONTARIO	N.-EAST	395226	30724	11215	1.24	$60.71	300	193	0		12.612
	ALGONQUIN	205850	25709	52087	1.24	$37.50	200	126	0		253.034
REGION 7	EASTERN	1159895	32078	71041	1.24	$86.89	430	264	0		61.248
	CENTRAL	5069941	35250	7968766	1.24	$29.28	140	85	0		1571.767
	SOUTH WEST	1872507	29882	148017	1.24	$46.73	240	144	0		79.048
	QUEBEC	6540270	30643	5370	4.15	$130.17	640	418	0		0.198
	MANITOBA	1071232	31262	914	3.89	$347.67	1700	1103	0		0.219
	US-EAST	90042000	53692	251831	1.66	$305.95	140	175	125		1.685
	US-CENTER	98262000	47990	179062	6.61	$357.79	140	205	150		0.276
	US-WEST	47302000	54270	1432	4.33	$610.64	140	415	250		0.007
ONTARIO	N.-WEST	55480	29355	232	1.24	$361.92	1800	1193	0		3.242
	NORTH	179118	29115	4839	1.24	$135.71	680	446	0		20.942

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
REGION 8	N.-EAST	395226	30724	18019	1.24	$102.75	485	348	0		35.342
	EASTERN	1159895	32078	14676	1.24	$136.60	675	416	0		9.808
	CENTRAL	5069941	35250	1055782	1.24	$48.00	225	143	0		208.243
	SOUTH WEST	1872507	29882	3518167	1.24	$50.05	250	161	0		1878.854
	NEW-FOUNDLAND	568349	23384	114	1.00	$458.47	225	323	200		0.201
	MANITOBA	1071232	31262	114	1.00	$412.72	2000	1326	0		0.106
	ALBERTA	2375278	36796	228	2.00	$429.59	225	343	175		0.048
	US-EAST	90042000	53692	27718	2.67	$329.13	225	233	125		0.115
	US-CENTER	98262000	47990	500368	1.27	$379.59	225	263	150		4.010
NEW-BRUNSW.	NOVA-SCOTIA	873199	27273	375	4.63	$103.07	536	341	0		0.093
	NEW-BRUNSWICK	710422	25106	478293	1.24	$20.15	106	71	0		673.252
REGION 1	QUEBEC	6540270	30643	702	1.48	$137.88	700	422	0		0.073
	ONTARIO	9113515	32001	1917	5.65	$338.19	106	191	150		0.037
	ALBERTA	2375278	36796	205	2.50	$565.00	106	341	250		0.035
	US-EAST	90042000	53692	7992	2.12	$298.74	106	161	125		0.042
	US-CENTER	98262000	47990	359	4.00	$414.91	106	261	175		0.001
NEW-BRUNSW.	P.-E.-I	126646	25457	285	4.11	$63.40	300	230	0	0.5	0.548
	NOVA-SCOTIA	873199	27273	1467	3.42	$121.87	580	460	0		0.491
REGION 2	NEW-BRUNSWICK	710422	25106	281012	1.24	$54.08	285	190	0		395.556
	QUEBEC	6540270	30643	1225	4.38	$172.05	873	527	0		0.043
	ONTARIO	9113515	32001	1356	4.58	$375.53	285	310	150		0.032
	US-EAST	90042000	53692	16117	5.37	$346.84	285	280	125		0.033
	US-CENTER	98262000	47990	648	3.91	$464.18	285	400	175		0.002
	US-WEST	47302000	54270	283	6.50	$708.57	285	550	275		0.001
NEW-BRUNSW.	NOVA-SCOTIA	873199	27273	606	4.17	$179.09	928	596	0		0.166
	NEW-BRUNSWICK	710422	25106	59727	1.24	$95.66	513	326	0		84.073
REGION 3	QUEBEC	6540270	30643	270	2.55	$112.86	550	367	0		0.016
	ONTARIO	9113515	32001	225	4.21	$421.03	513	446	150		0.006
	BRT.-COLUMBIA	2998207	33497	108	7.00	$698.93	513	626	275		0.005
	US-EAST	90042000	53692	2508	3.70	$404.63	513	416	125		0.008
	US-CENTER	98262000	47990	192	3.00	$518.74	513	536	175		0.001
	US-WEST	47302000	54270	44	7.00	$753.11	513	626	275		0.000
NEW-BRUNSW.	NOVA-SCOTIA	873199	27273	103	2.43	$108.71	565	360	0		0.049
	NEW-BRUNSWICK	710422	25106	36002	1.24	$25.61	135	90	0		50.677
REGION 4	ONTARIO	9113515	32001	44	2.65	$344.20	135	210	150		0.002
	US-EAST	90042000	53692	5746	2.03	$306.47	135	180	125		0.031
	US-CENTER	98262000	47990	108	7.00	$426.19	135	300	175		0.000
	US-WEST	47302000	54270	62	4.00	$654.39	135	390	275		0.000
NEW-BRUNSW.	NEW-BRUNSWICK	710422	25106	41273	1.24	$74.94	397	261	0		58.096
	QUEBEC	6540270	30643	160	3.67	$126.05	628	397	0		0.007

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residance Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
REGION 5	ONTARIO	9113513	32001	96	4.98	$398.44	397	381	150		0.002
	US-EAST	90042000	53692	78	2.50	$376.16	397	351	125		0.000
	US-CENTER	98262000	47990	61	3.00	$491.82	397	471	175		0.000
NEW-BRUNSW.	N.-BRUNSWICK	710422	25106	58877	1.24	$33.87	182	115	0		82.876
	ONTARIO	9113513	32001	41	2.00	$377.44	182	417	150		0.002
REGION 6	US-CENTER	98262000	47990	41	2.00	$436.83	182	325	175		0.000
NEW-BRUNSW.	N.-BRUNSWICK	710422	25106	118843	1.24	$52.05	276	181	0		167.285
	ONTARIO	9113513	32001	31	2.00	$373.25	276	301	150		0.002
REGION 7	US-EAST	90042000	53692	334	1.57	$343.75	276	271	125		0.002
NEW-BRUNSW.	P.-E.-I.	126646	25457	82	4.00	$68.74	366	234	0		0.162
	NOVA-SCOTIA	873199	27273	61	1.50	$93.40	481	314	0		0.047
REGION 8	N.-BRUNSWICK	710422	25106	106624	1.24	$12.52	66	44	0		150.085
	ONTARIO	9113513	32001	49	3.00	$329.79	66	164	150		0.002
	US-EAST	9004200	53692	1551	1.81	$287.90	66	134	125		0.095
NEW-BRUNSW.	N.-BRUNSWICK	710422	25106	81238	1.24	$87.35	462	305	0		114.352
	QUEBEC	6540270	30643	388	12.00	$134.35	694	400	0		0.005
REGION 9	US-EAST	90042000	53692	380	5.20	$393.81	462	395	125		0.001
NEW-BRUNSW.	NOVA-SCOTIA	873199	27273	61	3.00	$156.38	806	525	0		0.023
	N.-BRUNSWICK	710422	25106	42508	1.24	$101.01	541	345	0		59.835
REGION 10	QUEBEC	6540270	30643	36	1.33	$103.10	540	300	0		0.004
	ONTARIO	9113513	32001	221	6.45	$426.92	541	465	150		0.004
NEW-BRUNSW.	NOVA-SCOTIA	873199	27273	74	2.33	$54.75	300	165	0		0.036
	N.-BRUNSWICK	710422	25106	73799	1.24	$26.27	137	94	0		103.881
REGION 11	ONTARIO	9113513	32001	20	1.00	$344.97	137	214	150		0.002
	US-EAST	90042000	53692	584	13.49	$307.60	137	184	125		0.000
NEW-BRUNSW.	N.-BRUNSWICK	710422	25106	882	1.24	$26.04	72	109	0	1	1.242
REGION 13	US-EAST	90042000	53692	15	1.00	$309.16	72	199	125	1	0.000
P.-E.-I	P.-E.-I	126646	25457	28295	1.24	$21.97	115	77	0		223.418
	NOVA-SCOTIA	873199	27273	164	7.25	$70.60	345	257	0		0.026
REGION 1	NEW-BRUNSWICK	710422	25106	96	8.50	$81.91	415	307	0		0.016
	QUEBEC	6540270	30643	11	2.00	$224.38	1075	747	0		0.001
	ONTARIO	9113515	32001	288	25.50	$340.07	115	197	150		0.001
	US-EAST	90042000	53692	150	4.20	$301.16	115	167	125		0.000

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
P.-E.-I	NEW-FOUNDLAND	568349	23384	16	3.00	$268.78	55	125	125		0.009
	P.-E.-I	126646	25457	24600	1.24	$10.52	55	37	0		194.242
REGION 2	NOVA-SCOTIA	873199	27273	243	4.30	$58.86	285	217	0		0.065
	NEW-BRUNSWICK	710422	25106	135	12.00	$70.53	355	267	0		0.016
	QUEBEC	6540270	30643	123	3.50	$212.07	1015	707	0		0.005
	ONTARIO	9113515	32001	181	4.57	$27.53	55	157	0		0.004
	MANITOBA	1071232	31262	11	2.00	$342.42	55	275	150		0.005
	BRT.-COLUMBIA	2998207	33497	28	5.00	$612.01	55	397	275		0.002
	US-EAST	90042000	53692	262	11.33	$285.01	55	127	125		0.000
	US-CENTER	98262000	47990	14	2.00	$405.99	55	247	175		0.000
P.-E.-I	P.-E.-I	126646	25457	29138	1.24	$18.19	95	64	0		230.074
	NOVA-SCOTIA	873199	27273	317	8.00	$66.73	325	244	0		0.045
REGION 3	NEW-BRUNSWICK	710422	25106	67	12.00	$78.15	395	294	0		0.008
	QUEBEC	6540270	30643	16	3.00	$220.32	1055	734	0		0.001
	ONTARIO	9113515	32001	283	7.14	$335.93	95	184	150		0.004
	US-EAST	90042000	53692	578	8.67	$295.85	95	154	125		0.001
	US-CENTER	98262000	47990	14	2.00	$440.19	295	274	175		0.000
P.-E.-I	P.-E.-I	126646	25457	33841	1.24	$21.97	115	77	0		267.209
	NOVA-SCOTIA	873199	27273	198	3.50	$70.60	345	257	0		0.065
REGION 4	NEW-BRUNSWICK	710422	25106	130	2.56	$81.91	415	307	0		0.071
	QUEBEC	6540270	30643	28	5.00	$224.38	1075	747	0		0.001
	ONTARIO	9113515	32001	560	16.50	$340.07	115	197	150		0.004
	ALBERTA	2375278	36796	16	1.50	$567.00	115	347	250		0.004
	US-EAST	90042000	53692	215	15.00	$301.16	115	167	125		0.000
P.-E.-I	P.-E.-I	126646	25457	50592	1.24	$8.69	45	31	0		399.476
	NOVA-SCOTIA	873199	27273	170	5.80	$56.98	275	211	0		0.034
REGION 5	NEW-BRUNSWICK	710422	25106	268	6.71	$68.70	345	261	0		0.056
	QUEBEC	6540270	30643	50	9.00	$210.10	1005	701	0		0.001
	ONTARIO	9113515	32001	156	8.67	$325.53	45	151	150		0.002
	BRT.-COLUMBIA	2889207	33497	16	3.00	$609.97	45	391	275		0.002
	US-EAST	90042000	53692	258	5.00	$282.47	45	121	125		0.001
	US-CENTER	98262000	47990	7	1.00	$403.59	45	241	175		0.000
P.-E.-I	NEWFOUNDLAND	568349	23384	5	1.00	$271.75	70	137	125		0.009
	P.-E.-I	126646	25457	25638	1.24	$13.39	70	47	0		202.438
REGION 6	NOVA-SCOTIA	873199	27273	79	14.00	$61.80	300	227	0		0.006
	NEW-BRUNSWICK	710422	25106	73	2.17	$73.38	370	277	0		0.047
	ONTARIO	9113515	32001	271	6.86	$30.67	70	167	0		0.004
	MANITOBA	1071232	31262	11	1.00	$341.88	70	257	150		0.010
	US-EAST	90042000	53692	165	11.00	$289.05	70	137	125		0.000
	US-CENTER	98262000	47990	71	10.00	$409.79	70	257	175		0.000

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
NOVA-SCOTIA	YARMOUTH	27089	24890	19308	1.24	$7.41	35	31	0		712.762
	DIGBY	22348	22434	1092	1.24	$33.75	180	130	0		48.863
REGION 1	KINGS	51251	24483	1092	1.24	$59.34	310	217	0		5.463
	HANTS	34128	25254	655	1.24	$62.36	325	222	0		4.921
	CAPE BRETON	130897	26568	109	1.24	$149.08	770	512	0		0.214
	HALIFAX	296885	31479	328	1.24	$74.60	355	244	0		0.283
	N.-BRUNSW.	873199	25106	48	6.00	$148.18	785	516	0		0.009
	QUEBEC	6540270	30643	56	7.00	$322.48	1585	1036	0		0.001
	US-EAST	90042000	53692	133	2.82	$467.32	355	334	175		0.001
	US-CENTER	98262000	47990	33	3.00	$483.38	355	454	175		0.000
NOVA-SCOTIA	YARMOUTH	27089	24890	2540	1.24	$16.24	80	64	0		93.765
	DIGBY	22348	22434	22178	1.24	$10.11	50	44	0		992.393
REGION 2	ANNAPOLIS	23207	23207	2404	1.24	$15.79	80	64	0		103.589
	KINGS	51251	24483	1370	1.24	$34.86	180	130	0		8.250
	P.-E.-I	126646	25457	8	1.00	$113.20	580	411	0		0.063
	QUEBEC	6540270	30643	56	3.50	$289.87	1425	931	0		0.002
	US-EAST	90042000	53692	147	3.82	$433.68	235	248	175		0.000
NOVA-SCOTIA	YARMOUTH	27089	24890	1092	1.24	$41.42	200	168	0		12.404
	DIGBY	22348	22434	328	1.24	$18.04	95	71	0		14.677
REGION 3	ANNAPOLIS	23207	23424	22836	1.24	$12.97	65	53	0		984.013
	KINGS	51251	24483	9374	1.24	$31.84	165	118	0		182.904
	HANTS	34128	25254	218	1.24	$40.07	205	147	0		1.965
	CUMBERLAND	44538	25298	387	1.24	$55.99	290	201	0		2.674
	PICTOU	51881	25573	874	1.24	$66.97	345	240	0		5.183
	HALIFAX	296885	31479	3249	1.24	$49.71	235	164	0		3.367
	QUEENS	13525	24288	2184	1.24	$17.68	90	68	0		161.479
	P.-E.-I.	126646	25457	16	1.00	$112.31	570	414	0		0.126
	QUEBEC	6540270	30643	64	4.21	$289.05	1415	934	0		0.002
	SASKATCHEWAN	1010198	30786	48	3.60	$450.02	235	404	185		0.013
	US-EAST	90042000	53692	105	5.47	$435.02	235	254	175		0.000
	US-CENTER	98262000	47990	22	2.00	$452.98	235	374	175		0.000
NOVA-SCOTIA	KINGS	51251	24483	50179	1.24	$8.57	40	37	0		979.083
	HANTS	34128	25254	2621	1.24	$21.02	105	80	0		76.799
REGION 4	COLCHESTER	36302	22238	218	1.24	$53.42	290	201	0		2.441
	HALIFAX	296885	31479	1088	1.24	$36.93	170	126	0		1.490
	LUNENBURG	47137	26278	2022	1.24	$24.25	120	90	0		42.896
	QUEENS	13525	24288	546	1.24	$31.94	165	120	0		16.410
	QUEBEC	6540270	30643	8	1.00	$263.45	1290	851	0		0.001
	ALBERTA	2375278	36796	8	1.00	$581.11	170	396	250		0.003
	US-EAST	90042000	53692	150	3.59	$418.72	170	216	175		0.000
	US-CENTER	98262000	47990	14	2.00	$437.59	170	336	175		0.000
NOVA-SCOTIA	ANNAPOLIS	23207	23424	220	1.24	$38.95	205	147	0		2.678

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	KINGS	51251	24483	437	1.24	$8.57	40	37	0		8.527
REGION 5	HANTS	34128	25254	42631	1.24	$6.23	30	25	0		1249.150
	CUMBERLAND	44538	25298	775	1.24	$16.21	85	57	0		17.401
	HALIFAX	296885	31479	6586	1.24	$18.20	85	61	0		22.184
	LUNENBURG	47137	26278	546	1.24	$26.93	135	98	0		11.583
	P.-E.-I.	126646	25457	68	3.21	$72.65	365	272	0		0.167
	QUEBEC	6540270	30643	16	2.00	$246.32	1210	792	0		0.001
	MANITOBA	1071232	31262	40	5.00	$395.50	85	271	175		0.007
	US-EAST	90042000	53692	95	3.91	$399.35	85	175	175		0.000
NOVA-SCOTIA	CUMBERLAND	44538	25298	46171	1.24	$10.25	45	46	0		1036.665
	COLCHESTER	36302	22238	10051	1.24	$31.70	170	122	0		276.872
REGION 6	PICTOU	51881	25573	765	1.24	$19.99	100	75	0		14.745
	ANTIGONISH	18661	26948	218	1.24	$31.18	155	112	0		7.489
	CAPE BRETON	130897	26568	546	1.24	$69.72	355	245	0		2.674
	HALIFAX	296885	31479	1934	1.24	$30.52	145	100	0		6.514
	LUNENBURG	47137	26278	310	1.24	$43.75	225	153	0		4.216
	QUEENS	13525	24288	232	1.24	$50.92	270	183	0		10.996
	P.-E.-I.	126646	25457	622	1.27	$65.73	325	252	0		5.111
	N.-BRUNSW.	710422	25106	48	4.00	$70.76	370	252	0		0.017
	QUEBEC	6540270	30643	56	2.12	$238.97	1170	772	0		0.004
	US-EAST	90042000	53692	330	3.39	$409.91	145	190	175		0.001
	US-WEST	47302000	54270	29	4.00	$671.42	145	460	275		0.000
NOVA-SCOTIA	KINGS	51251	24483	296	1.24	$47.82	220	210	0		1.622
	HANTS	34128	25254	3177	1.24	$28.34	145	104	0		26.149
REGION 7	CUMBERLAND	44538	25298	4002	1.24	$20.12	100	77	0		89.856
	COLCHESTER	36302	22238	28970	1.24	$9.11	45	40	0		798.028
	PICTOU	51881	25573	659	1.24	$30.75	155	114	0		3.568
	HALIFAX	296885	31479	4490	1.24	$47.99	225	160	0		4.248
	P.-E.-I.	126646	25457	147	2.77	$42.03	200	170	0		0.419
	N.-BRUNSW.	710422	25106	32	1.00	$47.18	245	170	0		0.045
	QUEBEC	6540270	30643	39	3.00	$213.50	1045	690	0		0.002
	SASKAT.	101098	30786	24	3.00	$468.31	225	400	185		0.079
	US-EAST	90042000	53692	757	4.62	$432.93	225	250	175		0.002
	US-CENTER	98262000	47990	91	4.74	$450.98	225	370	175		0.000
NOVA-SCOTIA	KINGS	51251	24483	218	1.24	$33.65	175	124	0		1.432
	HANTS	34128	25254	765	1.24	$28.34	145	104	0		7.547
REGION 8	COLCHESTER	36302	22238	1768	1.24	$38.22	205	147	0		16.398
	PICTOU	51881	25573	55557	1.24	$6.80	30	30	0		1070.854
	ANTIGONISH	18661	26948	218	1.24	$17.72	85	67	0		11.682
	CAPE BRETON	130897	26568	218	1.24	$56.78	285	204	0		0.561
	HALIFAX	296885	31479	7606	1.24	$37.86	180	124	0		8.626
	QUEENS	13525	24288	546	1.24	$57.55	305	207	0		13.592
	P.-E.-I.	126646	25457	9	1.00	$72.58	360	277	0		0.071
	N.-BRUNSW.	710422	25106	8	1.00	$77.58	405	277	0		0.011
	QUEBEC	6540270	30643	67	2.70	$246.36	1205	797	0		0.004

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residance Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	SASKAT.	1010198	30786	24	3.00	$438.29	180	364	185		0.008
	ALBERTA	2375278	36796	16	1.50	$582.01	180	394	250		0.004
	US-EAST	90042000	53692	132	5.41	$419.48	180	214	175		0.000
	US-WEST	47302000	54270	35	4.00	$681.04	180	484	275		0.000
NOVA-SCOTIA	HANTS	34128	25254	437	1.24	$32.82	170	118	0		4.590
	PICTOU	51881	25573	5789	1.24	$10.37	50	41	0		111.582
REGION 9	ANTIGONISH	18661	26948	[illegible]	1.24	$3.82	15	18	0		468.946
	CAPE BRETON	130897	26568	1423	1.24	$42.52	215	151	0		3.896
	GUYSBOROUGH	13140	21559	546	1.24	$14.21	75	58	0		41.553
	HALIFAX	296885	31479	985	1.24	$42.70	205	138	0		1.189
	QUEENS	13525	24288	109	1.24	$61.97	330	221	0		2.889
	P.-E.-I.	126646	25457	71	1.94	$77.07	385	291	0		0.289
	N.-BRUNSWICK	710422	25106	8	1.00	$82.04	430	291	0		0.011
	SASKAT.	1010198	30786	8	1.00	$443.09	205	378	185		0.008
	ALBERTA	2375278	36796	8	1.00	$587.15	205	408	250		0.003
	US-EAST	90042000	53692	138	6.38	$425.61	205	228	175		0.000
	US-CENTER	98262000	47990	95	3.60	$457.58	205	415	175		0.000
NOVA-SCOTIA	KINGS	51251	24483	232	1.24	$61.54	325	221	0		0.688
	COLCHESTER	36302	22238	328	1.24	$65.21	355	244	0		1.373
REGION 10	INVERNESS	23016	26180	17659	1.24	$10.04	50	37	0		767.249
	CAPE BRETON	130897	26568	14136	1.24	$39.23	195	143	0		16.412
	RICHMOND	12657	23262	218	1.24	$26.18	135	103	0		17.224
	HALIFAX	296885	31479	4369	1.24	$68.59	330	221	0		2.236
	QUEENS	13525	24288	387	1.24	$85.36	455	304	0		4.349
	P.-E.-I.	126646	25457	124	4.15	$100.87	510	374	0		0.236
	N.-BRUNSW.	710422	25106	40	4.00	$105.72	555	374	0		0.014
	QUEBEC	6540270	30643	662	5.21	$276.75	1355	894	0		0.019
	ONTARIO	9113515	32001	32	4.00	$333.73	330	331	125		0.001
	SASKAT.	1010198	30786	32	4.00	$468.86	330	462	185		0.008
	ALBERTA	2375278	36796	15	2.00	$614.88	330	491	250		0.003
	US-EAST	90042000	53692	3085	8.03	$459.18	330	311	175		0.004
	US-CENTER	98262000	47990	191	3.28	$475.78	330	431	175		0.001
	US-WEST	47302000	54270	49	6.00	$720.98	330	581	275		0.000
NOVA-SCOTIA	KINGS	51251	24483	155	1.24	$81.29	430	291	0		0.884
	COLCHESTER	36302	22238	765	1.24	$78.84	430	294	0		6.162
REGION 11	VICTORIA	8688	23266	4925	1.24	$9.08	45	38	0		566.874
	CAPE BRETON	130897	26568	40504	1.24	$29.58	145	110	0		90.478
	HALIFAX	296885	31479	440	1.24	$86.15	405	271	0		0.433
	QUEENS	13525	24288	77	1.24	$99.42	530	354	0		1.665
	P.-E.-I.	126646	25457	8	1.00	$115.17	585	424	0		0.063
	N.-BRUNSW.	710422	25106	84	14.00	$119.95	630	424	0		0.008
	QUEBEC	6540270	30643	114	2.33	$292.13	1430	944	0		0.007
	ONTARIO	9113515	32001	32	4.00	$400.73	405	391	150		0.001
	US-EAST	90042000	53692	62	3.06	$479.36	405	361	175		0.000
	US-CENTER	98262000	47990	22	2.00	$494.78	405	481	175		0.000

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Days	Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Fre	Visit Rate
NOVA-SCOTIA	DIGBY	22348	22434	109	1.24	$94.65	520	345	0		0.761
	KINGS	51251	24483	328	1.24	$74.34	390	270	0		0.998
REGION 12	INVERNESS	23016	26180	546	1.24	$39.00	195	143	0		3.701
	CAPE BRETON	130897	26568	116137	1.24	$9.27	45	35	0		887.240
	HALIFAX	296885	31479	2200	1.24	$82.81	395	270	0		1.156
	P.-E.-I.	126646	25457	80	10.00	$113.87	575	423	0		0.063
	QUEBEC	6540270	30643	402	9.23	$290.80	1420	943	0		0.007
	SASKAT.	1010198	30786	35	1.60	$480.25	240	635	185		0.022
	US-EAST	90042000	53692	125	4.69	$477.94	395	360	175		0.000
	US-CENTER	98262000	47990	22	1.75	$493.38	395	480	175		0.000
NOVA-SCOTIA	HANTS	34128	25254	109	1.24	$60.03	310	217	0		0.711
	COLCHESTER	36302	22238	328	1.24	$68.49	370	260	0		2.012
REGION 13	INVERNESS	23016	26180	1312	1.24	$27.44	135	103	0		12.696
	CAPE BRETON	130897	26568	10635	1.24	$18.33	90	68	0		81.247
	RICHMOND	12657	23262	6922	1.24	$318.06	40	3232	0		546.891
	QUEBEC	6540270	30643	103	3.29	$280.59	1370	910	0		0.005
	SASKAT.	1010198	30786	48	5.14	$486.44	345	585	185		0.009
	US-EAST	90042000	53692	175	10.95	$464.33	345	326	175		0.000
	US-CENTER	98262000	47990	11	1.00	$480.58	345	446	175		0.000
NOVA-SCOTIA	KINGS	51251	24483	437	1.24	$45.63	240	165	0		1.838
	HANTS	34128	25254	697	1.24	$40.46	210	145	0		4.402
REGION 14	COLCHESTER	36302	22238	4280	1.24	$49.82	270	188	0		25.409
	PICTOU	51881	25573	33168	1.24	$18.05	90	68	0		639.309
	ANTIGONISH	18661	26948	4806	1.24	$11.54	55	44	0		257.542
	INVERNESS	23016	26180	1084	1.24	$36.49	185	131	0		10.150
	VICTORIA	8688	23266	387	1.24	$44.10	235	164	0		9.600
	CAPE BRETON	130897	26568	765	1.24	$30.30	255	178	0		1.260
	GUYSBOROUGH	13140	21559	24397	1.24	$8.81	45	38	0		1856.697
	HALIFAX	296885	31479	10654	1.24	$48.72	230	161	0		35.006
	LUNENBURG	47137	26278	637	1.24	$60.63	310	214	0		2.912
	NEWFOUNDLAND	568349	23384	48	8.00	$77.63	310	415	0		0.011
	P.-E.-I.	126646	25457	202	2.29	$84.73	425	318	0		0.697
	N.-BRUNSW.	710422	25106	72	3.33	$89.67	470	318	0		0.030
	QUEBEC	6540270	30643	271	7.04	$259.40	1270	838	0		0.006
	SASKAT.	1010198	30786	153	9.24	$449.04	230	401	185		0.016
	US-EAST	90042000	53692	680	4.92	$433.75	230	251	175		0.002
	US-CENTER	98262000	47990	44	2.93	$451.78	230	371	175		0.000
NOVA-SCOTIA	KINGS	51251	24483	685	1.24	$32.35	165	123	0		3.702
	HANTS	34128	25254	19386	1.24	$29.30	145	115	0		568.038
REGION 15	COLCHESTER	36302	22238	7767	1.24	$47.42	260	175	0		59.267
	PICTOU	51881	25573	6053	1.24	$28.85	180	68	0		32.319
	ANTIGONISH	18661	26948	218	1.24	$45.94	235	158	0		3.236
	INVERNESS	23016	26180	155	1.24	$69.54	365	236	0		1.865

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Days	Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	HALIFAX	296885	31479	187935	1.24	$21.37	95	76	0		633.023
	LUNENBURG	47137	26278	264	1.24	$35.23	175	130	0		5.601
	QUEENS	13525	24288	810	1.24	$43.50	225	163	0		16.590
	P.-E.-I.	126646	25457	345	2.39	$82.15	415	305	0		1.140
	N.-BRUNSW.	710422	25106	8	1.00	$87.11	460	305	0		0.011
	QUEBEC	6540270	30643	338	4.32	$256.54	1260	825	0		0.012
	SASKAT.	1010198	30786	88	4.13	$421.93	95	316	185		0.021
	ALBERTA	2375278	36796	38	4.00	$564.45	95	346	250		0.004
	US-EAST	90042000	53692	282	8.30	$398.54	95	166	175		0.000
	US-CENTER	98262000	47990	22	1.75	$418.59	95	286	175		0.000
NOVA-SCOTIA	YARMOUTH	27089	24890	546	1.24	$52.81	275	191	0		4.401
	ANNAPOLIS	23207	23424	218	1.24	$24.79	135	88	0		9.394
REGION 16	KINGS	51251	24483	3604	1.24	$24.28	125	91	0		70.321
	HANTS	34128	25254	4411	1.24	$20.81	105	78	0		129.249
	COLCHESTER	36302	22238	109	1.24	$60.08	330	221	0		0.656
	CAPE BRETON	130897	26568	546	1.24	$96.09	500	326	0		0.911
	HALIFAX	296885	31479	9296	1.24	$21.37	95	76	0		31.312
	LUNENBURG	47137	26278	45938	1.24	$36.54	185	131	0		974.564
	QUEENS	13525	24288	1370	1.24	$12.96	65	51	0		101.294
	P.-E.-I.	126646	25457	28	2.67	$0.00	230	183	0	0.5	0.083
	QUEBEC	6540270	30643	114	4.24	$270.81	1330	871	0		0.004
	SASKAT.	1010198	30786	8	1.00	$423.39	105	318	185		0.008
	US-EAST	90042000	53692	193	6.42	$400.18	105	168	175		0.000
	US-CENTER	98262000	47990	90	5.60	$420.19	105	288	175		0.000
	US-WEST	47302000	54270	14	2.00	$661.64	105	438	275		0.000
NOVA-SCOTIA	ANNAPOLIS	23207	23424	218	1.24	$19.03	100	72	0		9.394
	KINGS	51251	24483	1529	1.24	$38.08	200	138	0		9.978
REGION 17	COLCHESTER	36302	22238	328	1.24	$69.83	385	255	0		3.022
	HALIFAX	296885	31479	655	1.24	$33.89	160	112	0		0.738
	LUNENBURG	47137	26278	5573	1.24	$46.87	240	165	0		118.230
	QUEENS	13525	24288	15477	1.24	$7.03	35	28	0		1144.325
	P.-E.-I.	126646	25457	8	1.00	$105.64	540	385	0		0.063
	QUEBEC	6540270	30643	40	2.50	$281.75	1385	905	0		0.002
	US-EAST	90042000	53692	129	3.60	$414.39	160	202	175		0.000
	US-CENTER	98262000	47990	73	3.27	$433.59	160	322	175		0.000
NOVA-SCOTIA	CAPE BRETON	130897	26568	109	1.24	$121.12	620	422	0		0.303
	HALIFAX	296885	31479	624	1.24	$45.66	210	136	0		0.764
REGION 18	SHELBURNE	17855	24786	13009	1.24	$7.32	30	36	0		728.591
	P.-E.-I.	126646	25457	32	4.00	$96.32	480	365	0		0.063
	QUEBEC	6540270	30643	24	3.00	$293.37	1435	949	0		0.001
	US-EAST	90042000	53692	21	3.00	$430.23	210	246	175		0.000
	US-CENTER	98262000	47990	11	1.00	$448.38	210	366	175		0.000

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
NEWFOUNDL.	ST-JOHNS	200495	33907	38913	1.24	$22.88	100	77	0		194.085
	GRAND-FALLS	84930	26318	153547	1.24	$86.14	440	304	0		440.957
REGION 1	HUMBER	80985	28087	135162	1.24	$141.13	705	483	0		1668.976
	BONAVISTA	89905	22865	5547	1.24	$37.72	200	144	0		61.698
	LABRADOR	28740	34827	124026	1.24	$281.22	150	160	120		1052.549
	BURIN	83300	24905	4898	1.24	$62.87	325	230	0		58.800
	P.-E.-I.	126646	25457	76	7.00	$327.43	350	334	125		0.086
	NOVA-SCOTIA	873199	27273	3109	5.76	$349.95	350	334	135		0.618
	N.-BRUNSWICK	710422	25106	326	4.24	$326.94	350	334	125		0.108
	QUEBEC	6540270	30643	330	4.75	$428.48	350	364	170		0.011
	ONTARIO	9113515	32001	1121	6.05	$498.54	350	424	200		0.020
	MANITOBA	1071232	31262	58	7.00	$552.86	350	544	220		0.008
	ALBERTA	2375278	36796	9	1.00	$634.60	350	604	250		0.004
	US-EAST	90042000	53692	2102	7.60	$536.86	350	424	200		0.003
	US-CENTER	98262000	47990	133	5.87	$662.77	350	604	250		0.000
	US-WEST	47302000	54270	118	3.75	$792.15	350	664	300		0.001
NEWFOUNDL.	ST-JOHNS	200495	33907	9328	1.24	$87.67	428	257	0		7.565
	GRAND-FALLS	84930	26318	7995	1.24	$17.88	96	58	0		94.136
REGION 2	HUMBER	80985	28087	112033	1.24	$43.75	230	138	0		1383.380
	BONAVISTA	89905	22865	2099	1.24	$62.60	347	220	0		3.796
	LABRADOR	28740	34827	35073	1.24	$283.15	96	218	120		198.432
	BURIN	83300	24905	94580	1.24	$78.50	425	265	0		184.620
	P.-E.-I.	126646	25457	12	2.00	$277.22	96	148	125		0.047
	NOVA-SCOTIA	873199	27273	1542	5.37	$298.34	96	148	135		0.329
	N.-BRUNSWICK	710422	25106	211	4.29	$277.00	96	148	125		0.069
	QUEBEC	6540270	30643	225	3.78	$374.25	96	178	170		0.009
	ONTARIO	9113515	32001	564	6.62	$443.25	96	238	200		0.009
	MANITOBA	1071232	31262	33	4.00	$498.15	96	358	220		0.008
	US-EAST	90042000	53692	1333	10.27	$464.76	96	238	200		0.001
	US-WEST	47302000	47990	73	7.07	$707.10	96	478	300		0.000
NEWFOUNDL.	ST-JOHNS	200495	33907	24677	1.24	$134.38	656	394	0		123.080
	GRAND-FALLS	84930	26318	4156	1.24	$44.59	240	144	0		48.934
REGION 3	BONAVISTA	89905	22865	2589	1.24	$107.44	600	372	0		4.056
	BURIN	83300	24905	89126	1.24	$129.68	695	446	0		1069.940
	NOVA-SCOTIA	873199	27273	280	5.57	$346.68	353	302	135		0.058
	ONTARIO	9113515	32001	116	14.00	$482.63	353	302	200		0.001
	US-EAST	90042000	19886	118	15.00	$474.84	353	392	200		0.000
	US-WEST	47302000	20100	24	3.00	$595.29	353	632	250		0.000
NEWFOUNDL.	ST-JOHNS	200495	33907	546281	1.24	$44.34	200	144	0		2724.661
	GRAND-FALLS	84930	26318	2681	1.24	$46.51	235	167	0		31.567
REGION 4	HUMBER	80985	28087	933	1.24	$94.32	470	324	0		2.203
	BONAVISTA	89905	22865	203086	1.24	$13.83	70	57	0		2258.896
	LABRADOR	28740	34827	5139	1.24	$318.02	320	273	120		34.189
	BURIN	83300	24905	2250	1.24	$37.72	195	138	0		27.011
	P.-E.-I.	126646	25457	44	7.00	$298.82	200	234	125		0.050

INFORMATION OBTAINED AND DERIVED FROM THE SURVEY, 1985

Fishery Zone	Residence Zone	Population Total	Average Income 1985	Fishing Days	Excursion Cost Days	Excursion Cost Total	Dist. KM	Dist. Min.	Air Fare $	Ferry Hrs	Visit Rate
	NOVA-SCOTIA	873199	27273	56	4.31	$320.59	200	234	135		0.015
	N.-BRUNSWICK	710422	25106	50	2.45	$298.48	200	234	125		0.029
	QUEBEC	6540270	30643	48	3.17	$397.71	200	264	170		0.002
	ONTARIO	9113515	32001	134	6.67	$467.20	200	324	200		0.002
	ALBERTA	2375278	36796	8	1.00	$601.27	200	504	250		0.003
	US-EAST	90042000	53692	486	6.94	$496.48	200	324	200		0.001
	US-CENTER	98262000	47990	17	2.00	$636.78	200	564	250		0.000
NEWFOUNDL.	ST-JOHNS	200495	33907	34391	1.24	$280.60	150	160	120		171.530
	GRAND-FALLS	84930	26318	81664	1.24	$285.16	200	193	120		961.545
REGION 5	HUMBER	80985	28087	542	1.24	$306.43	300	260	120		0.984
	BONAVISTA	89905	22865	133524	1.24	$304.41	320	273	120		1485.168
	LABRADOR	28740	34827	10783	1.24	$34.40	150	113	0		55.175
	BURIN	83300	24905	25857	1.24	$298.22	275	243	120		45.648
	NOVA-SCOTIA	873199	27273	258	7.19	$306.18	150	160	135		0.041
	N.-BRUNSW.	710422	25106	25	3.00	$284.74	150	160	125		0.012
	QUEBEC	6540270	30643	69	5.50	$378.43	150	160	170		0.002
	ONTARIO	9113515	32001	504	6.63	$439.33	150	160	200		0.008
	MANITOBA	1071232	31262	58	7.00	$478.84	150	160	220		0.008
	BRT.COLUMBIA	2889207	33497	17	2.00	$640.33	150	160	300		0.003
	US-EAST	90042000	53692	534	6.62	$453.79	150	160	200		0.001
	US-CENTER	98262000	47990	108	12.17	$549.99	150	160	250		0.000
	US-WEST	47302000	54270	71	9.00	$654.18	150	160	300		0.000
NEWFOUNDL.	ST-JOHNS	200495	33907	3448	1.24	$72.84	335	231	0		3.796
	GRAND-FALLS	84930	26318	575	1.24	$84.88	435	298	0		1.495
REGION 6	HUMBER	80985	28087	622	1.24	$97.16	480	338	0		1.695
	LABRADOR	94935	18657	67580	1.24	$291.89	275	243	120		711.855
	P.-E.-I.	126646	25457	32	5.00	$324.25	335	321	125		0.051
	NOVA-SCOTIA	873199	27273	505	4.97	$346.68	335	321	135		0.116
	N.-BRUNSWICK	710422	25106	518	4.77	$323.78	335	321	125		0.153
	QUEBEC	6540270	30643	3029	2.71	$425.02	335	351	170		0.171
	ONTARIO	9113515	32001	1158	6.18	$495.00	335	411	200		0.021
	MANITOBA	1071232	31262	25	4.00	$568.06	335	521	230		0.006
	US-EAST	90042000	53692	3922	6.53	$532.15	335	411	200		0.007
	US-CENTER	98262000	47990	842	6.40	$656.38	335	581	250		0.001
	US-WEST	47302000	54270	201	5.00	$785.15	335	641	300		0.001

APPENDIX 5

ESTIMATE OF THE CONSUMER SURPLUS WITH DIFFERENT SCENARIOS FOR CALCULATINGTHE DURATION OF OUTINGS OF RESIDENT ANGLERS

First scenario: Duration of stay for residents

Consumer Surplus estimation with different types of B.U.E

For Eastern Canada (maximal version)

	Surplus Current BUE	Surplus Original BUE	Lost Surplus BUE based on 1980		Surplus BUE Canada	Surplus BUE Can+US	Surplus BUE less than 10%
QUEBEC							
A	$34,702,325	$58,941,644	$24,239,319	$30,812,679	$32,154,446	$36,521,283	$30,350,931
B	$33,102,725	$43,998,004	$10,895,278	$27,048,221	$29,060,122	$31,495,333	$25,419,690
C	$28,890,419	$31,274,858	$2,384,439	$27,961,840	$29,060,935	$30,110,187	$27,536,407
D	$19,756,764	$21,390,422	$1,633,658	$19,124,485	$19,876,210	$20,593,845	$18,833,510
E	$129,629,520	$140,348,397	$10,718,877	$125,480,968	$130,413,244	$135,121,843	$123,571,802
F	$53,782,552	$58,883,854	$5,101,302	$49,690,592	$44,270,188	$54,207,825	$48,894,178
G	$48,049,128	$54,544,971	$6,495,843	$39,062,790	$44,631,760	$48,039,054	$36,343,116
H	$33,170,851	$37,392,595	$4,221,745	$26,156,750	$29,183,540	$31,395,497	$24,867,874
I	$48,183,739	$57,430,486	$9,246,748	$41,856,159	$45,335,943	$48,489,881	$39,573,311
J	$43,084,318	$48,449,712	$5,365,394	$38,826,517	$41,541,794	$44,255,955	$37,582,305
K	$69,958,735	$85,770,859	$15,812,125	$54,737,234	$61,784,042	$62,458,474	$52,251,104
L	$30,768,414	$38,750,602	$7,982,189	$27,467,146	$29,417,757	$31,417,332	$26,203,077
M	$15,323,847	$26,027,442	$10,703,595	$13,606,258	$14,198,755	$16,127,062	$13,402,359
SUBT.	$588,403,335	$703,203,846	$114,800,510	$521,831,638	$550,928,737	$590,233,572	$504,829,666
ONTARIO							
1	$124,731,014	$125,012,971	$281,957	$124,082,516	$124,317,790	$124,577,560	$123,968,713
2	$110,874,426	$111,170,764	$296,338	$110,487,974	$110,565,812	$110,695,594	$110,428,684
3	$67,465,421	$68,082,919	$617,498	$66,890,335	$67,120,574	$67,392,690	$66,710,789
4	$221,666,844	$368,728,078	$147,061,233	$221,926,031	$258,753,848	$284,389,144	$202,557,199
5	$297,757,444	$358,834,846	$61,077,403	$106,473,342	$156,285,931	$206,353,404	$95,683,540
6	$294,596,917	$311,336,360	$16,739,443	$210,171,151	$222,704,850	$234,203,955	$206,498,955
7	$487,227,182	$584,410,779	$97,183,597	$193,971,016	$270,904,451	$329,041,743	$179,856,617
8	$264,708,469	$324,743,869	$60,035,400	$101,795,162	$149,463,068	$184,744,277	$93,623,970
SUBT.	$1,869,027,717	$2,252,320,586	$383,292,869	$1,135,797,526	$1,360,116,325	$1,541,398,367	$1,079,328,467
N.-B.							
1	$33,063,341	$41,989,685	$8,926,345	$27,909,741	$28,727,055	$30,145,379	$27,294,735
2	$19,516,761	$24,844,104	$5,327,343	$18,487,826	$18,850,358	$19,976,353	$18,361,084
3	$4,944,261	$6,293,859	$1,349,598	$4,683,597	$4,775,438	$5,060,691	$4,651,489
4	$2,218,564	$2,817,525	$598,961	$1,872,755	$1,927,597	$2,022,767	$1,831,488
5	$1,812,608	$2,307,382	$494,774	$1,717,046	$1,750,716	$1,855,292	$1,705,275
6	$1,869,464	$2,379,757	$510,293	$1,770,905	$1,805,631	$1,913,487	$1,758,764
7	$3,235,604	$4,118,802	$883,198	$3,065,021	$3,125,123	$3,311,798	$3,044,009
8	$4,880,092	$6,197,605	$1,317,513	$4,119,430	$4,240,064	$4,449,406	$4,028,656
9	$2,906,377	$3,699,708	$793,332	$2,753,151	$2,807,138	$2,974,818	$2,734,277
10	$3,058,754	$3,893,680	$834,925	$2,897,495	$2,954,313	$3,130,704	$2,877,632
11	$2,728,971	$3,473,877	$744,906	$2,585,098	$2,635,789	$2,793,234	$2,567,376
13	$28,482	$36,172	$7,690	$24,043	$24,747	$25,969	$23,513
SUBT.	$80,263,278	$102,052,156	$21,788,878	$71,886,106	$73,623,970	$77,659,979	$70,878,296
P.-E.-I.							
1	$988,432	$1,390,964	$402,532	$994,706	$1,051,574	$1,151,935	$947,468
2	$2,010,739	$2,829,598	$818,859	$2,023,503	$2,139,186	$2,343,348	$1,927,407
3	$1,228,037	$1,728,147	$500,109	$1,235,833	$1,306,485	$1,431,175	$1,177,143
4	$2,736,746	$3,147,644	$910,899	$2,250,944	$2,379,630	$2,606,740	$2,144,046

5	$4,509,576	$3,204,547	$1,305,029	$3,224,889	$3,409,256	$3,734,632	$3,071,739
6	$1,953,556	$1,388,215	$565,341	$1,397,028	$1,476,895	$1,617,849	$1,330,682
SUBTOTAL	$15,559,484	$11,056,716	$4,502,768	$11,1_6,904	$11,763,026	$12,885,679	$10,598,484
N.-S.							
1	$5,375,618	$791,909	$4,583,709	$2,564,204	$2,648,456	$3,204,681	$2,505,598
2	$1,558,972	$864,797	$694,175	$1,012,617	$1,106,043	$1,262,510	$925,210
3	$2,514,450	$1,322,718	$1,191,732	$1,633,240	$1,783,926	$2,036,288	$1,492,261
4	$4,252,001	$2,269,473	$1,982,528	$2,761,851	$3,016,665	$3,443,417	$2,523,453
5	$3,160,804	$1,844,999	$1,315,805	$2,109,380	$2,312,835	$2,629,495	$1,917,734
6	$4,644,069	$2,893,916	$1,750,154	$3,178,901	$3,497,604	$3,962,115	$2,876,953
7	$2,868,281	$1,677,282	$1,190,999	$1,963,360	$2,160,198	$2,447,091	$1,776,870
8	$5,730,955	$3,351,897	$2,379,058	$3,922,882	$4,316,174	$4,889,398	$3,550,268
9	$1,445,232	$815,963	$629,269	$964,484	$1,057,511	$1,202,299	$876,856
10	$2,123,829	$1,187,076	$936,753	$1,647,222	$1,743,597	$1,811,157	$1,604,725
11	$1,090,604	$635,251	$455,353	$845,862	$895,352	$930,044	$824,040
12	$9,022,336	$4,969,192	$4,053,144	$6,997,638	$7,407,057	$7,694,059	$6,817,109
13	$1,469,102	$857,974	$611,128	$1,139,422	$1,206,087	$1,252,820	$1,110,026
14	$14,843,230	$2,916,108	$11,927,122	$7,623,548	$7,911,801	$9,309,324	$7,444,954
15	$66,235,536	$9,024,476	$57,211,060	$31,594,773	$32,632,885	$39,486,400	$30,872,655
16	$19,494,930	$2,777,874	$16,717,056	$9,299,206	$9,604,751	$11,621,927	$9,086,667
17	$5,187,509	$731,829	$4,455,681	$2,474,475	$2,555,779	$3,092,540	$2,417,919
18	$3,146,674	$444,447	$2,702,227	$1,500,983	$1,550,301	$1,875,894	$1,466,627
SUBTOTAL	$154,164,131	$39,377,181	$114,786,950	$83,234,047	$87,407,024	$102,151,458	$80,089,977
NFLD.							
1	$17,994,058	$16,202,083	$1,791,975	$16,001,260	$16,239,822	$16,413,543	$15,916,114
2	$7,016,817	$6,163,808	$853,009	$6,362,776	$6,395,698	$6,412,371	$6,351,902
3	$4,185,494	$4,022,770	$162,724	$3,795,362	$3,815,000	$3,824,946	$3,788,876
4	$31,044,205	$27,114,698	$3,929,507	$27,606,135	$28,017,714	$28,317,425	$27,459,238
5	$11,289,196	$9,561,259	$1,727,937	$9,813,267	$9,991,811	$10,343,023	$9,681,975
6	$5,746,653	$4,608,668	$1,137,985	$5,110,225	$5,186,413	$5,241,893	$5,083,032
SUBTOTAL	$77,276,423	$67,673,287	$9,603,136	$68,689,024	$69,646,459	$70,553,200	$68,281,138
TOTAL	$3,261,970,518	$2,639,293,456	$622,677,062	$1,860,733,704	$2,119,006,264	$2,358,773,992	$1,784,725,966

Second scenario: Duration of stay for residents = duration for non-residents

Consummer Surplus estimation with different types of B.U.E

For Eastern Canada (minimal version)

QUEBEC	Surplus Current BUE	Surplus Original BUE	Lost	Surplus BUE based on 1980	Surplus BUE Canada	Surplus BUE Can+US	Surplus BUE less than 10%
A	$34,702,325	$58,941,644	$24,239,319	$30,812,679	$32,154,446	$36,521,283	$30,350,931
B	$33,102,725	$43,998,004	$10,895,278	$27,048,221	$29,060,122	$31,495,333	$25,419,690
C	$28,890,419	$31,274,858	$2,384,439	$27,961,840	$29,060,935	$30,110,187	$27,536,407
D	$19,756,764	$21,390,422	$1,633,658	$19,124,485	$19,876,210	$20,593,845	$18,833,510
E	$129,629,520	$140,348,397	$10,718,877	$125,480,968	$130,413,244	$135,121,843	$123,571,802
F	$53,782,552	$58,883,854	$5,101,302	$49,690,592	$44,270,188	$54,207,825	$48,894,178
G	$48,049,128	$54,544,971	$6,495,843	$39,062,790	$44,631,760	$48,039,054	$36,343,116
H	$33,170,851	$37,392,595	$4,221,745	$26,156,750	$29,183,540	$31,395,497	$24,867,874
I	$48,183,739	$57,430,486	$9,246,748	$41,856,159	$45,335,943	$48,489,881	$39,573,311
J	$43,084,318	$48,449,712	$5,365,394	$38,826,517	$41,541,794	$44,255,955	$37,582,305
K	$69,958,735	$85,770,859	$15,812,125	$54,737,234	$61,784,042	$62,458,474	$52,251,104
L	$30,768,414	$38,750,602	$7,982,189	$27,467,146	$29,417,757	$31,417,332	$26,203,077
M	$15,323,847	$26,027,442	$10,703,595	$13,606,258	$14,198,755	$16,127,062	$13,402,359
SUBT.	$588,403,335	$703,203,846	$114,800,510	$521,831,638	$550,928,737	$590,233,572	$504,829,666
ONTARIO							
1	$75,893,786	$76,065,346	$171,559	$75,499,201	$75,642,356	$75,800,416	$75,429,957
2	$30,831,184	$39,035,143	$8,203,959	$38,795,396	$38,822,728	$38,868,298	$38,774,578
3	$16,423,267	$16,573,586	$150,319	$16,283,272	$16,339,320	$16,405,561	$16,239,565
4	$52,097,191	$86,660,219	$34,563,027	$52,158,107	$60,813,554	$66,838,483	$47,605,952
5	$58,157,379	$70,086,893	$11,929,514	$20,796,157	$30,525,450	$40,304,528	$18,688,715
6	$117,379,659	$124,049,350	$6,669,690	$83,740,924	$88,734,871	$93,316,593	$82,277,769
7	$248,586,608	$298,081,993	$49,495,384	$98,936,004	$138,176,334	$167,829,585	$91,736,876
8	$217,908,073	$267,329,228	$49,421,155	$83,797,801	$123,038,032	$152,081,532	$77,071,274
SUBT.	$817,277,148	$977,881,757	$160,604,609	$470,006,862	$572,092,645	$651,444,995	$447,824,684
N.-B.							
1	$15,145,221	$19,234,084	$4,088,863	$12,784,528	$13,158,913	$13,808,600	$12,502,814
2	$4,436,549	$5,647,561	$1,211,011	$4,202,652	$4,285,063	$4,541,024	$4,173,841
3	$1,499,692	$1,909,051	$409,360	$1,420,627	$1,448,484	$1,535,007	$1,410,888
4	$1,218,881	$1,547,951	$329,070	$1,028,893	$1,059,024	$1,111,310	$1,006,221
5	$583,796	$743,150	$159,354	$553,018	$563,862	$597,543	$549,227
6	$992,790	$1,263,784	$270,994	$940,449	$958,891	$1,016,169	$934,002
7	$2,111,991	$2,688,486	$576,494	$2,000,646	$2,039,877	$2,161,726	$1,986,931
8	$2,800,532	$3,556,612	$756,080	$2,364,012	$2,433,240	$2,553,375	$2,311,920
9	$619,278	$788,317	$169,040	$586,629	$598,132	$633,861	$582,608
10	$829,127	$1,055,448	$226,321	$785,415	$800,816	$848,652	$780,031
11	$417,656	$531,660	$114,004	$395,637	$403,395	$427,491	$392,924
13	$28,482	$36,172	$7,690	$24,043	$24,747	$25,969	$23,513
SUBT.	$30,683,996	$39,002,276	$8,318,280	$27,086,549	$27,774,444	$29,260,726	$26,654,919
P.-E.-I.							
1	$135,296	$190,395	$55,098	$136,155	$143,939	$157,677	$129,689
2	$437,625	$615,844	$178,220	$440,403	$465,581	$510,015	$419,488
3	$178,327	$250,950	$72,623	$179,459	$189,719	$207,826	$170,937
4	$399,834	$562,663	$162,830	$402,372	$425,376	$465,973	$383,263

5	$4,509,576	$3,204,547	$1,305,029	$3,224,889	$3,409,256	$3,734,632	$3,071,739
6	$1,953,556	$1,388,215	$565,341	$1,397,028	$1,476,895	$1,617,849	$1,330,682
SUBTOTAL	$15,559,484	$11,056,716	$4,502,768	$11,126,904	$11,763,026	$12,885,679	$10,598,484
N.-S.							
1	$5,375,618	$791,909	$4,583,709	$2,564,204	$2,648,456	$3,204,681	$2,505,598
2	$1,558,972	$864,797	$694,175	$1,012,617	$1,106,043	$1,262,510	$925,210
3	$2,514,450	$1,322,718	$1,191,732	$1,633,240	$1,783,926	$2,036,288	$1,492,261
4	$4,252,001	$2,269,473	$1,982,528	$2,761,851	$3,016,665	$3,443,417	$2,523,453
5	$3,160,804	$1,844,999	$1,315,805	$2,109,380	$2,312,835	$2,629,495	$1,917,734
6	$4,644,069	$2,893,916	$1,750,154	$3,178,901	$3,497,604	$3,962,115	$2,876,953
7	$2,868,281	$1,677,282	$1,190,999	$1,963,360	$2,160,198	$2,447,091	$1,776,870
8	$5,730,955	$3,351,897	$2,379,058	$3,922,882	$4,316,174	$4,889,398	$3,550,268
9	$1,445,232	$815,963	$629,269	$964,484	$1,057,511	$1,202,299	$876,856
10	$2,123,829	$1,187,076	$936,753	$1,647,222	$1,743,597	$1,811,157	$1,604,725
11	$1,090,604	$635,251	$455,353	$845,862	$895,352	$930,044	$824,040
12	$9,022,336	$4,969,192	$4,053,144	$6,997,638	$7,407,057	$7,694,059	$6,817,109
13	$1,469,102	$857,974	$611,128	$1,139,422	$1,206,087	$1,252,820	$1,110,026
14	$14,843,230	$2,916,108	$11,927,122	$7,623,548	$7,911,801	$9,309,324	$7,444,954
15	$66,235,536	$9,024,476	$57,211,060	$31,594,773	$32,632,885	$39,486,400	$30,872,655
16	$19,494,930	$2,777,874	$16,717,056	$9,299,206	$9,604,751	$11,621,927	$9,086,667
17	$5,187,509	$731,829	$4,455,681	$2,474,475	$2,555,779	$3,092,540	$2,417,919
18	$3,146,674	$444,447	$2,702,227	$1,500,983	$1,550,301	$1,875,894	$1,466,627
SUBTOTAL	$154,164,131	$39,377,181	$114,786,950	$83,234,047	$87,407,024	$102,151,458	$80,089,977
NFLD.							
1	$17,994,058	$16,202,083	$1,791,975	$16,001,260	$16,239,822	$16,413,543	$15,916,114
2	$7,016,817	$6,163,808	$853,009	$6,362,776	$6,395,698	$6,412,371	$6,351,902
3	$4,185,494	$4,022,770	$162,724	$3,795,362	$3,815,000	$3,824,946	$3,788,876
4	$31,044,205	$27,114,698	$3,929,507	$27,606,135	$28,017,714	$28,317,425	$27,459,238
5	$11,289,196	$9,561,259	$1,727,937	$9,813,267	$9,991,811	$10,343,023	$9,681,975
6	$5,746,653	$4,608,668	$1,137,985	$5,110,225	$5,186,413	$5,241,893	$5,083,032
SUBTOTAL	$77,276,423	$67,673,287	$9,603,136	$68,689,024	$69,646,459	$70,553,200	$68,281,138
TOTAL	$3,261,970,518	$2,639,293,456	$622,677,062	$1,860,733,704	$2,119,006,264	$2,358,773,992	$1,784,725,966

Third scenario: Duration of stay for residents = duration for residents of Quebec

Consummer Surplus estimation with different types of B.U.E

	Surplus Current BUE	Surplus Original BUE	Lost	Surplus BUE based on 1980	Surplus BUE Canada	Surplus BUE Can+US	Surplus BUE less than 10%
QUEBEC							
A	$58,941,644	$34,702,325	$24,239,319	$30,812,679	$32,154,446	$36,521,283	$30,350,931
B	$43,998,004	$33,102,725	$10,895,278	$27,048,221	$29,060,122	$31,495,333	$25,419,690
C	$31,274,858	$28,890,419	$2,384,439	$27,961,840	$29,060,935	$30,110,187	$27,536,407
D	$21,390,422	$19,756,764	$1,633,658	$19,124,485	$19,876,210	$20,593,845	$18,833,510
E	$140,348,397	$129,629,520	$10,718,877	$125,480,968	$130,413,244	$135,121,843	$123,571,802
F	$58,883,854	$53,782,552	$5,101,302	$49,690,592	$44,270,188	$54,207,825	$48,894,178
G	$54,544,971	$48,049,128	$6,495,843	$39,062,790	$44,631,760	$48,039,054	$36,343,116
H	$37,392,595	$33,170,851	$4,221,745	$26,156,750	$29,183,540	$31,395,497	$24,867,874
I	$57,430,486	$48,183,739	$9,246,748	$41,856,159	$45,335,943	$48,489,881	$39,573,311
J	$48,449,712	$43,084,318	$5,365,394	$38,826,517	$41,541,794	$44,255,955	$37,582,305
K	$85,770,859	$69,958,735	$15,812,125	$54,737,234	$61,784,042	$62,458,474	$52,251,104
L	$38,750,602	$30,768,414	$7,982,189	$27,467,146	$29,417,757	$31,417,332	$26,203,077
M	$26,027,442	$15,323,847	$10,703,595	$13,606,258	$14,198,755	$16,127,062	$13,402,359
SUBTOTAL	$703,203,846	$588,403,335	$114,800,510	$521,831,638	$550,928,737	$590,233,572	$504,829,666
ONTARIO							
1	$123,095,125	$122,817,493	$277,631	$122,178,943	$122,410,608	$122,666,393	$122,066,887
2	$108,938,913	$108,648,524	$290,389	$108,269,831	$108,346,107	$108,473,283	$108,211,731
3	$58,473,896	$57,943,550	$530,346	$57,449,630	$57,647,374	$57,881,084	$57,295,424
4	$307,263,674	$184,716,525	$122,547,149	$184,932,507	$215,621,383	$236,983,453	$168,792,324
5	$356,511,943	$295,829,922	$60,682,021	$105,784,091	$155,274,220	$205,017,583	$95,064,137
6	$322,834,043	$311,016,811	$11,817,232	$221,885,421	$235,117,709	$247,257,738	$218,008,549
7	$603,445,636	$503,245,777	$100,199,859	$200,288,851	$279,728,087	$339,758,970	$185,714,732
8	$329,151,247	$268,301,055	$60,850,192	$103,176,711	$151,491,560	$187,251,600	$94,894,621
SUBTOTAL	$2,209,714,478	$1,852,519,658	$357,194,820	$1,103,965,985	$1,325,637,048	$1,505,290,104	$1,050,048,405
N.-B.							
1	$41,989,685	$33,063,341	$8,926,345	$27,909,741	$28,727,055	$30,145,379	$27,294,735
2	$24,844,104	$19,516,761	$5,327,343	$18,487,826	$18,850,358	$19,976,353	$18,361,084
3	$6,293,859	$4,944,261	$1,349,598	$4,683,597	$4,775,438	$5,060,691	$4,651,489
4	$2,817,525	$2,218,564	$598,961	$1,872,755	$1,927,597	$2,022,767	$1,831,488
5	$2,307,382	$1,812,608	$494,774	$1,717,046	$1,750,716	$1,855,292	$1,705,275
6	$2,379,757	$1,869,464	$510,293	$1,770,905	$1,805,631	$1,913,487	$1,758,764
7	$4,118,802	$3,235,604	$883,198	$3,065,021	$3,125,123	$3,311,798	$3,044,009
8	$6,197,605	$4,880,092	$1,317,513	$4,119,430	$4,240,064	$4,449,406	$4,028,656
9	$3,699,708	$2,906,377	$793,332	$2,753,151	$2,807,138	$2,974,818	$2,734,277
10	$3,893,680	$3,058,754	$834,925	$2,897,495	$2,954,313	$3,130,784	$2,877,632
11	$3,473,877	$2,728,971	$744,906	$2,585,098	$2,635,789	$2,793,234	$2,567,376
13	$36,172	$28,482	$7,690	$24,043	$24,747	$25,969	$23,513
SUBTOTAL	$102,052,156	$80,263,278	$21,788,878	$71,886,106	$73,623,970	$77,659,979	$70,878,296
P.-E.-I.							
1	$1,390,964	$988,432	$402,532	$994,706	$1,051,574	$1,151,935	$947,468
2	$2,829,598	$2,010,739	$818,859	$2,023,503	$2,139,186	$2,343,348	$1,927,407
3	$1,728,147	$1,228,037	$500,109	$1,235,833	$1,306,485	$1,431,175	$1,177,143
4	$3,147,644	$2,236,746	$910,899	$2,250,944	$2,379,630	$2,606,740	$2,144,046

5	$735,019	$1,034,350	$299,331	$739,685	$781,972	$856,603	$704,557
6	$283,404	$398,818	$115,414	$285,203	$301,508	$330,283	$271,658
SUBT.	$2,169,505	$3,053,020	$883,515	$2,183,277	$2,308,094	$2,528,377	$2,079,592
N.-S.							
1	$234,178	$1,589,642	$1,355,464	$758,270	$783,184	$947,667	$740,939
2	$300,516	$541,740	$241,225	$351,883	$384,348	$438,720	$321,509
3	$507,527	$914,921	$407,393	$594,279	$649,108	$740,934	$542,982
4	$1,025,976	$1,849,530	$823,553	$1,201,346	$1,312,185	$1,497,813	$1,097,648
5	$596,908	$1,005,846	$408,939	$671,257	$736,002	$836,771	$610,271
6	$1,949,600	$3,092,768	$1,143,168	$2,117,023	$2,329,267	$2,638,613	$1,915,938
7	$636,810	$1,010,210	$373,400	$691,497	$760,823	$861,867	$625,815
8	$1,414,931	$2,244,590	$829,659	$1,536,439	$1,690,476	$1,914,985	$1,390,500
9	$364,708	$614,569	$249,860	$410,136	$449,695	$511,264	$372,873
10	$420,621	$667,257	$246,636	$517,518	$547,797	$569,023	$504,167
11	$563,441	$893,821	$330,380	$693,239	$733,799	$762,232	$675,354
12	$962,541	$1,526,937	$564,396	$1,184,278	$1,253,568	$1,302,140	$1,153,725
13	$231,347	$367,000	$135,653	$284,642	$301,296	$312,970	$277,299
14	$803,685	$3,768,555	$2,964,870	$1,935,546	$2,008,731	$2,363,549	$1,890,203
15	$2,995,807	$20,336,069	$17,340,262	$9,700,434	$10,019,162	$12,123,373	$9,478,725
16	$709,209	$4,814,235	$4,105,027	$2,296,421	$2,371,875	$2,870,013	$2,243,935
17	$292,711	$1,986,976	$1,694,265	$947,800	$978,942	$1,184,538	$926,138
18	$181,547	$1,232,376	$1,050,828	$587,851	$607,166	$734,682	$574,415
SUBT.	$14,192,066	$48,457,043	$34,264,977	$26,479,860	$27,917,425	$32,611,155	$25,342,437
NFDL.							
1	$6,138,007	$6,602,285	$464,279	$5,871,098	$5,958,630	$6,022,371	$5,839,857
2	$2,193,117	$2,281,830	$88,713	$2,069,140	$2,079,846	$2,085,268	$2,065,603
3	$673,690	$700,942	$27,251	$635,607	$638,895	$640,561	$634,520
4	$7,006,310	$7,536,267	$529,957	$6,701,644	$6,801,559	$6,874,316	$6,665,984
5	$1,701,621	$1,855,318	$153,698	$1,612,757	$1,642,100	$1,699,820	$1,591,180
6	$1,420,206	$1,527,630	$107,424	$1,358,449	$1,378,702	$1,393,450	$1,351,220
SUBT.	$19,132,951	$20,504,273	$1,371,322	$18,248,695	$18,499,732	$18,715,786	$18,148,365
TOTAL	$1,471,859,001	$1,792,102,215	$320,243,214	$1,065,836,880	$1,199,521,079	$1,324,794,611	$1,024,879,664

APPENDIX 6

EVALUATIONOF THE BIOLOGICAL PRODUCTIVITY OF WATERBODIES (BY LOGIMER)

TABLE OF CONTENTS

	Page
Introduction	107
Review of literature	107
Relative method of assessing the production of water bodies in Quebec	109
Bibliography	115
Appendix 1	123

LIST OF TABLES

		Page
Table 1	Distribution of thirteen sub-samples of Quebec within four pH categories.	111
Table 2	Mean hydrogen ion concentration in pH units for the thirteen sectors under study.	112

ASSESSMENT OF THE BIOLOGICAL PRODUCTION OF QUEBEC LAKES

The assessment of potential availability of fish resources for sport fishing in Quebec can be based on the concept of the "quality" of the lakes. In an effort to improve the management of the recreational fishery and thereby guarantee the maintenance or improvement of Quebec's fishery for present and future generations, a number of provincial and federal departments have attempted to isolate the physical and chemical factors that determine the potential fish production of lakes and the causes of fluctuation.

Review of Literature

In 1965, the relationship between the concentration of total dissolved solids (which constitute nutrients) and mean depth was expressed by Ryder as the morphoedaphic index. This index often indicates a significant relationship with the multispecies fish yield of lakes and can therefore be used as a management tool for lakes for which it has been recognized to be valid or lakes meeting certain criteria.

In order to apply the Ryder's index, the lakes selected must have an area of more than 200 hectares; be located in the north temperate climatic region at altitudes less than 600 m; be subject to an unlimited moderate to intensive fishing effort; and be relatively unaffected by specific environmental conditions, such as pollution or other stresses (Ryder, 1965; Ryder et al, 1974; Ryder, 1981).

The morphoedaphic index was initially developed for a series of lakes in North America, but other authors have since used it for other environments and different climates (Venkins and Morais, 1974; Henderson et al, 1973; Henderson and Welcome, 1974; Ryder et al, 1974).

Loranger and his colleagues (1986) attempted to validate Ryder's morphoedaphic index on the basis of information available on a number of lakes in Quebec. They conclude that this index was ineffective as an integrative variable of the quality of the environment. According to Minns and his colleagues, the morphoedaphic index is not useful for forecasting fish yields in lakes in the Canadian Shield, although some scientists believe it is effective for predicting fish yields in unpolluted lakes.

Frenette (1986) attempted to correlate the biomass of seventeen lakes in the Temiscamingue region with a comparable index (conductivity/mean depth). However, the analysis of his results does not show a significant relation. The negative curve which results from this analysis may indicate may indicate the presence of a biological stress in the environment (Ryder et al, 1974, in Frenette, 1986).

Frenette (1986) also tried to establish a relation by simple linear regression between total fish biomass and mean depth, surface area and conductivity. None of these variable explain the observed difference in biomass.

This author also calculated a significant difference ($P<0.005$) between the fish biomass of acid lakes and that of non-acid lakes. In addition, the relation between the total fish biomass harvested per unit of effort and the hydrogen ion concentration ($pH = \log 1/[H^+]$) in the lakes has shown that fish biomass decreases with an increase in acidity.

This relation was developed for only 17 small unexploited lakes in the Temiscamingue region, and the total biomass of the various species of fish per unit of effort is on average 2.6 times higher in acid lakes than in non-acid lakes. A more recent sampling, the results of which will be published this year, demonstrates that for 36 other lakes in the same region, the total biomass per unit of effort is 2.1 times less in acid lakes (Frenette, personal communication). By running a multiple regression of the biomass with several chemical and physical variables, it was possible to determine that pH, mean depth and colour accounted for close to 50 per cent of the variance (Frenette, personal communication). with pH being the most significant variable.

Frenette (1986) concludes that the toxic effects of acidity may directly or indirectly affect fish survival, as is demonstrated by the reduction of the diversity and fish biomass in relation to the acidity of the environment.

On the basis of this hypothesis, Richard (1986) conducted an analysis of statistics on the sport fishery in 52 lakes in the Martres controlled harvesting zone (ZEC), and revealed that problems regarding the harvesting of stocks were directly related to the acidity of the lakes and to their sensitivity to acidification.

At present, there is no model for Quebec, for assessing fish biomass or predicting overall lake productivity. Recent work would seem to suggest, however, that the decrease in pH (increase in acidity) owing to acid precipitation has already reduced the sport fishery biomass in our lakes. In light of these facts and of the various parameters available for our analysis, the hydrogen ion concentration (or pH) appears to be a key variable in the assessment of the decrease in the potential fish yield. J.J. Frenette is presently working on a model which would include the acidity of the body of water (pH) as a variable which would account for the variance.

Since the model has not yet been completed, the biological potential can be assessed in terms of modification of the gross economic value. An index corresponding to this value will be used to obtain an approximate estimate of the relative proportion of fish loss associated with this value that is attributable to acid precipitation.

Methodology for Assessing Fish Production in Bodies of Water in Quebec

The method used by Yvon Richard, a researcher with the Aquatics Surveys Branch of the Quebec Department of the Environment (MENVIQ), consists in establishing four categories of lakes based on the mean pH of each lake, measured over the last year or two years sampled (MENVIQ data). The fish biomass of these lakes with pH levels exceeding 6.0 are considered to unaffected by acidification; for lakes with pH levels between 5.6 and 6.0,

acidification is considered to have little or no effect on them; those with pH levels between 5.1 and 5.5 are considered to be substantially affected by acidification and those for which the pH is 5.0 or less are acidified.

For each of the 13 sectors, between 30 and 50 lakes were randomly selected from the 1985 hydrological directory (MENVIQ). The lakes last sampled prior to 1975 were subsequently eliminated. All lakes in sectors A, D, E and F were sampled after 1975, but some sectors are definitely under-represented.

The mean pH of each lake and each zone was calculated by determining the mean hydrogen ion concentration measure between zero and one metres from the surface. The mean pH values were then compiled for each zone in order to evaluate the proportion of lakes in each of the four pH categories previously described (Table 1). The mean hydrogen ion concentration in the bodies of water was evaluated for each sector under study (Table 2).

The relative decrease in fish biomass owing to acidity was evaluated using the relation developed by Frenette (1986):

$$\log [BUE\ (g) + 1] = 3.42 - 0/16\ [H^+]$$

BUE = biomass per unit of effort
$[H^+]$ = concentration of hydrogen ions

This relation does not, however, constitute a predictive model. It was developed for 17 small unexploited almost colourless headwater lakes in the Temiscamingue region. We then applied this relation to the province of Quebec as a whole.

DISTRIBUTION OF THIRTEEN SUB-SAMPLES OF QUEBEC LAKES WITHIN FOUR pH CATEGORIES

SECTOR	TOTAL NUMBER OF LAKES IN THE SUB-SAMPLE	LAKES							
		pH over 6.0		5.6 ≤ pH ≤ 6.0		5.1 ≤ pH ≤ 5.5		pH 5 and Less	
		n	%	n	%	n	%	n	%
A	14*	14	100%						
B	22*	21	95.5%			1	4.5%		
C	28*	27	96.4%	1	3.6%				
D	1**	1	100%						
E	4*	3	75%	1	25%				
F	21*	13	61.9%	6	28.6%	1	4.8%	1	4.8%
G	48*	38	79.2%	7	14.6%	2	4.2%	1	2.1%
H	45*	29	64.4%	12	26.7%	3	6.7%	1	2.1%
I	40*	12	30%	19	47.5%	6	15%	3	7.5%
J	44*	24	54.5%	12	27.3%	5	11.4%	3	6.8%
K	33*	24	72.7%	8	24.2%			1	3%
L	29*	18	62.1%	6	20.7%	1	3.4%	4	13.8%
M	46*	26	56.5%	14	30.4%	3	6.5%	3	6.5%

* Most recent samples of the Quebec Department of the Environment

** Samples of the federal Department of the Environment

MEAN HYDROGEN ION CONCENTRATING IN pH UNITS FOR THE THIRTEEN SECTORS UNDER STUDY

SECTOR	TOTAL NUMBER OF LAKES IN THE SUB-SAMPLE	AVERAGE [H+] EXPRESSED IN pH
A	14	7.2
B	22	6.3
C	28	6.7
D	1	7.7
E	4	6.3
F	21	5.8
G	48	6.0
H	45	5.8
I	40	5.5
J	44	5.5
K	33	6.0
L	29	5.4
M	46	5.1

Biomass, expressed as the total weight of fish taken per unit of effort, was used here as an index of productivity or a demographic measurement of the effects of acidity on the fish populations in the lakes (Frenette, 1986). The biomass per unit of effort in the lakes with pH levels over 6.0 was considered to be the reference value of the relation, that is, a constant multi-species biomass (BUE = 100 per cent).

When the relation was applied to the other three categories, the results were relative biomass values equal to 67 per cent ($5.6 \leq pH \leq 5.5$) and one per cent ($pH \leq 5.0$) of the constant multi-species biomass.

This means therefore, that in each zone, the lakes which, according to our sub-sampling, are located in the category in which pH values vary between 6.0 and 5.6, for example, will be considered to have a biomass that is reduced to 67 per cent of its theoretical biomass under non-acidic conditions.

Nonetheless, there is some uncertainty regarding the usefulness of such a relation as a predictor. There is no confidence interval for this relation and it is impossible to evaluate its reliability since only a small number of lakes was used in its development. However, it seems it will be possible to modify the interpretation of the results after the publication of calculations recently performed for 36 other lakes in the Temiscamingue region (Frenette, personal communication).

APPENDIX 1

LIST OF pH AND AREAS, AND CALCULATION OF BIOMASS BY UNIT OF EFFORT (ACCORDING TO THE RELATION BY FRENETTE, 1986) FOR 375 LAKES IN THE 13 SECTORS STUDIED

lake no.	(sector)	sector	pH	area km²	last year sampled	BUE	pH * km²	avg pH * km²	BUE * km²	avg BUE * km²
3444	1	a	7.0	0.54	1984	2534.13	3.78		1368.429	
3761	1	a	7.7	0.70	1980	2610.00	5.39		1827.002	
3386	1	a	7.9	1.32	1992	2617.10	10.428		3454.567	
3407	1	a	7.3	0.47	1984	2581.15	3.431		1213.139	
3225	1	a	7.2	0.30	1983	2568.83	2.16		770.6495	
1554	1	a	7.3	0.28	1980	2581.15	2.044		722.7212	
3230	1	a	7.8	0.60	1984	2613.95	4.68		1568.372	
3761	1	a	7.7	0.70	1980	2610.00	5.39		1827.002	
2862	1	a	7.8	0.96	1980	2613.95	7.488		2509.396	
1534	1	a	8.1	0.88	1984	2621.58	7.128		2306.992	
3376	1	a	6.7	1.33	1983	2442.86	8.911		3248.999	
3441	1	a	6.8	0.17	1983	2480.09	1.156		421.6145	
1689	1	a	7.4	4.10	1979	2590.97	30.34		10622.98	
3438	1	a	7.1	0.31	1984	2553.41	2.201	7.466587	791.5573	2579.259
3685	2	b	8.1	0.50	1976	2621.58	4.05		1310.790	
2393	2	b	6.1	1.22	1978	1961.94	7.442		2393.569	
1611	2	b	6.5	7.40	1979	2340.01	48.1		17316.08	
1501	2	b	6.7	1.20	1980	2442.86	8.04		2931.428	
2354	2	b	6.5	6.20	1976	2340.01	40.95		14742.07	
1498	2	b	6.5	2.51	1981	2340.01	16.315		5873.429	
3188	2	b	7.3	1.30	1979	2581.15	9.49		3355.491	
1726	2	b	7.7	0.72	1979	2610.00	5.544		1879.203	
1864	2	b	7.7	2.33	1984	2610.00	17.941		6081.309	
1764	2	b	5.1	0.45	1984	139.95	2.295		62.97892	
1903	2	b	7.2	1.88	1978	2568.83	13.536		4829.403	
1852	2	b	8.3	0.70	1976	2624.42	5.81		1837.091	
3542	2	b	7.3	0.54	1979	2581.15	3.942		1393.819	
1850	2	b	7.5	3.60	1984	2599.80	27		9355.688	
2756	2	b	6.5	0.41	1984	2340.01	2.665		959.4047	
3599	2	b	7.6	1.05	1979	2605.04	7.99		2735.291	
1842	2	b	7.7	2.43	1984	2610.00	18.711		6342.310	
1628	2	b	7.1	0.13	1982	2553.41	0.923		331.9434	
3577	2	b	7.5	0.39	1984	2599.80	2.925		1013.532	
3681	2	b	8.0	0.40	1976	2619.60	3.2		1047.828	
3639	2	b	8.1	5.70	1976	2621.58	46.17		14943.01	
3382	2	b	7.6	0.86	1980	2605.04	6.526	7.129105	2240.333	2450.643
35926	3	c	7.5	4.70	1985	2598.80	35.25		12214.27	
1520	3	c	7.4	0.28	1982	2590.97	2.072		725.4721	
1517	3	c	5.7	2.00	1983	1260.12	11.4		2520.249	
1492	3	c	6.5	2.80	1983	2340.01	18.2		6552.032	
1819	3	c	7.0	1.80	1983	2534.13	12.6		4561.431	
2611	3	c	6.9	0.16	1982	2510.06	1.104		401.6096	
1822	3	c	6.9	4.14	1980	2510.06	28.566		10391.65	
1803	3	c	6.9	1.86	1980	2510.06	12.834		4668.712	
1786	3	c	6.7	1.04	1984	2442.86	6.968		2540.571	
2245	3	c	6.5	0.18	1982	2340.01	1.17		421.2020	
2602	3	c	7.1	1.98	1980	2553.41	14.058		5055.753	
1817	3	c	7.1	0.84	1980	2553.41	5.964		2144.865	
26887	3	c	6.4	1.23	1980	2270.45	7.872		2792.651	
1799	3	c	6.7	0.34	1980	2442.86	2.278		830.5714	
36420	3	c	7.5	0.90	1980	2598.80	6.75		2338.922	
1755	3	c	6.9	1.11	1980	2510.06	7.659		2786.167	

	1807	3	c	7.2	31.42	1984	2568.83	226.224		80712.69	
	1513	3	c	6.8	2.51	1980	2480.09	17.068		6225.014	
	1325	3	c	7.4	2.38	1984	2590.97	17.612		6166.513	
	2572	3	c	7.3	0.69	1985	2581.15	5.037		1780.391	
	1473	3	c	6.4	0.46	1980	2270.45	2.944		1044.406	
	1754	3	c	7.5	4.92	1984	2598.80	36.9		12786.10	
	1531	3	c	6.6	0.56	1983	2335.78	3.636		1342.198	
	1814	3	c	7.3	0.64	1980	2581.15	4.672		1651.934	
	4795	3	c	6.9	0.31	1983	2510.06	2.139		778.1187	
	1339	3	c	6.5	0.08	1982	2340.01	0.52		187.2003	
	1791	3	c	6.9	2.50	1983	2510.06	17.25		6275.151	
	1516	3	c	7.2	0.60	1980	2568.83	4.32	7.084453	1541.299	2505.009
t-pierre		4	d	7.7		1979	2610.00		7.7	522000.8	2610
	35968	5	e	8.2	0.10	1977	2623.16	0.82		262.3160	
	1409	5	e	5.9	0.21	1981	1653.14	1.239		347.1591	
	1472	5	e	7.6	14.60	1984	2605.04	110.96		38033.57	
	2686	5	e	6.2	0.02	1978	2083.72	0.124	7.578231	41.67431	2591.073
	4743	6	f	6.1	0.16	1983	1961.94	0.976		313.9107	
	766	6	f	4.9	0.34	1981	24.45	1.666		8.313628	
	1401	6	f	6.2	1.93	1976	2083.72	11.966		4021.571	
	1404	6	f	6.5	3.50	1984	2340.01	22.75		8190.040	
	1420	6	f	7.0	1.58	1976	2534.13	11.06		4003.922	
	4340	6	f	6.7	0.26	1983	2442.86	1.742		635.1428	
	737	6	f	5.7	0.90	1981	1260.12	5.13		1134.112	
	735	6	f	5.4	1.20	1976	605.78	6.48		726.9314	
	1356	6	f	6.2	2.60	1976	2083.72	16.12		5417.660	
	102	6	f	6.2	0.90	1976	2083.72	5.58		1875.344	
	773	6	f	6.6	1.00	1976	2396.78	6.6		2396.782	
	4303	6	f	5.9	0.44	1978	1653.14	2.596		727.2810	
	129	6	f	5.8	0.50	1976	1465.96	2.9		732.9780	
	177	6	f	5.6	0.50	1990	1041.55	2.8		520.7765	
	144	6	f	6.0	0.50	1976	1818.70	3		909.3504	
	395	6	f	6.8	2.00	1976	2480.09	13.6		4960.170	
	1367	6	f	6.4	1.34	1976	2270.45	8.576		3042.400	
	1349	6	f	6.9	0.50	1976	2510.06	3.45		1255.030	
	4731	6	f	6.7	0.54	1983	2442.86	3.618		1319.142	
	1402	6	f	6.9	4.00	1984	2510.06	27.6		19040.24	
	4758	6	f	5.8	3.00	1976	1465.96	17.4	6.342000	4397.868	2045.109
	331	7	g	6.4	0.90	1979	2270.45	5.76		2043.403	
	4411	7	g	7.1	1.10	1977	2553.41	7.81		2808.751	
	4574	7	g	6.5	0.44	1976	2340.01	2.86		1029.605	
	6243	7	g	7.6	3.10	1984	2605.04	23.56		8075.622	
	841	7	g	7.2	7.41	1978	2568.83	53.352		19035.04	
	6593	7	g	6.9	0.70	1976	2510.06	4.83		1757.042	
	6355	7	g	6.0	1.50	1980	1816.70	9		2728.051	
	6587	7	g	6.8	0.40	1976	2480.09	2.72		992.0341	
	7060	7	g	6.5	0.34	1983	2340.01	2.21		795.6039	
	4038	7	g	7.2	0.47	1983	2568.83	3.384		1207.350	
	7217	7	g	5.3	0.75	1985	414.05	3.975		310.5375	
	6682	7	g	4.8	0.05	1982	6.66	0.24		0.332948	
	7064	7	g	6.5	0.78	1985	2340.01	5.07		1825.209	
	7071	7	g	5.6	0.34	1983	1041.55	1.904		354.1280	
	6337	7	g	6.3	0.70	1985	2185.80	4.41		1520.063	
	6520	7	g	6.5	1.73	1980	2340.01	11.245		4048.219	
	4134	7	g	6.2	2.60	1980	2083.72	16.12		5417.660	
	2756	7	g	5.8	0.10	1982	1465.96	0.58		146.3956	

6961	7	9	6.3	1.10	1978	2340.01	7.15	2574.012	
4164	7	9	7.9	0.42	1977	2617.10	3.318	1099.180	
4388	7	9	6.1	0.08	1983	1961.94	0.488	156.9553	
4422	7	9	6.3	0.13	1983	2185.80	0.819	284.1546	
302	7	9	7.2	7.38	1976	2568.83	53.136	18957.97	
621	7	9	6.6	3.90	1979	2396.78	25.74	9347.452	
4435	7	9	7.0	0.39	1980	2534.13	2.73	988.2101	
6321	7	9	6.0	0.13	1983	1818.70	0.78	236.4211	
928	7	9	5.9	0.78	1985	1653.14	4.602	1289.448	
4412	7	9	6.6	1.40	1977	2396.78	9.24	3355.495	
2082	7	9	5.4	1.10	1980	605.78	5.94	666.3538	
6779	7	9	6.1	1.26	1980	1961.94	7.686	2472.047	
6206	7	9	6.4	2.90	1979	2270.45	18.56	6584.300	
142	7	9	6.1	0.30	1976	1961.94	1.83	588.5826	
39215	7	9	7.3	0.10	1980	2581.15	0.73	258.1147	
6288	7	9	6.4	0.85	1983	2270.45	5.44	1929.881	
2217	7	9	8.3	0.21	1977	2624.42	1.743	551.1273	
849	7	9	6.5	1.00	1980	2340.01	6.5	2340.011	
581	7	9	7.7	46.53	1978	2610.00	358.281	121443.4	
4442	7	9	8.0	0.98	1976	2619.60	7.84	2557.203	
6547	7	9	6.4	0.26	1992	2270.45	1.664	590.3165	
6618	7	9	5.6	0.15	1982	1041.55	0.84	156.2323	
7078	7	9	6.3	0.56	1983	2185.80	3.528	1224.050	
1162	7	9	6.3	307.17	1983	2185.80	1935.171	671413.6	
4466	7	9	8.3	0.31	1950	2624.42	2.573	813.5689	
6277	7	9	6.6	0.54	1983	2396.78	3.564	1294.262	
4511	7	9	7.1	3.70	1977	2553.41	26.27	9447.620	
4215	7	9	7.4	2.20	1976	2590.97	16.28	5700.138	
6327	7	9	5.8	0.18	1983	1465.96	1.044	263.8720	
4505	7	9	6.4	0.20	1992	2270.45	1.28	6.527505	454.0896 2253.663
531	8	h	6.7	5.10	1979	2442.86	34.17		12458.57
15144	8	h	6.4	0.05	1982	2270.45	0.32		113.5224
5323	8	h	6.4	0.75	1983	2270.45	4.8		1702.836
5303	8	h	6.1	0.10	1992	1961.94	0.61		196.1942
9384	8	h	6.5	3.40	1978	2340.01	22.1		7956.039
6029	8	h	6.2	0.08	1982	2083.72	0.496		166.6972
11496	8	h	5.7	0.13	1982	1260.12	0.741		163.8162
9845	8	h	6.1	5.91	1984	1961.94	36.051		11595.07
423	8	h	6.7	0.23	1983	2442.86	1.541		561.8571
9815	8	h	5.1	3.20	1979	139.95	16.32		447.8501
9286	8	h	5.9	0.26	1980	1653.14	1.534		429.8160
8956	8	h	5.3	0.91	1980	819.42	5.005		745.6710
464	8	h	6.0	3.29	1983	1818.70	19.74		5983.525
4825	8	h	6.7	0.36	1983	2442.86	2.412		879.4285
1605	8	h	6.0	14.50	1984	1818.70	87		26371.16
4926	8	h	5.9	3.30	1976	1653.14	19.47		5455.357
9832	8	h	6.5	0.70	1980	2340.01	4.55		1638.008
9058	8	h	6.9	0.75	1980	2510.06	5.175		1882.545
5493	8	h	6.6	0.30	1978	2396.78	1.98		719.0348
8589	8	h	5.6	0.36	1980	1041.55	2.016		374.9591
404	8	h	6.2	12.00	1976	2083.72	74.4		25004.58
9463	8	h	5.3	0.60	1986	414.05	3.18		248.4300
771	8	h	6.1	1.00	1976	1961.94	6.1		1961.942
9470	8	h	6.4	0.10	1982	2270.45	0.64		227.0448
9304	8	h	6.7	0.15	1980	2442.86	1.005		366.4285
9740	8	h	6.4	0.50	1980	2270.45	3.2		1135.224

16308	8	h	4.6	0.13	1980	-0.75	0.598	-0.09727	
8408	8	h	6.6	0.41	1980	2396.78	2.706	982.6808	
9151	8	h	5.6	0.46	1980	1041.55	2.576	479.1144	
5203	8	h	6.6	1.00	1976	2396.78	6.6	2396.782	
5397	8	h	6.4	0.98	1985	2270.45	6.272	2225.039	
5141	8	h	6.6	0.23	1980	2396.78	1.519	551.2500	
8434	8	h	6.0	0.78	1982	1818.70	4.68	1418.586	
393	8	h	6.3	1.76	1976	2185.80	11.088	3847.016	
8591	8	h	6.1	1.70	1980	1961.94	10.37	3335.301	
733	8	h	5.8	13.75	1980	1465.96	79.75	20156.89	
5953	8	h	6.0	0.03	1982	1818.70	0.18	54.56102	
20936	8	h	6.0	0.10	1982	1818.70	0.6	181.8700	
5201	8	h	6.4	0.50	1986	2270.45	3.2	1135.224	
5179	8	h	6.9	0.44	1983	2510.06	3.036	1104.426	
8675	8	h	7.0	1.60	1980	2534.13	11.2	4054.605	
3643	8	h	6.3	0.36	1984	2185.80	2.268	786.2887	
818	8	h	6.8	3.30	1979	2480.09	22.44	8184.281	
5080	8	h	6.7	0.10	1982	2442.86	0.67	244.2857	
9553	8	h	5.9	5.50	1978	1653.14	32.45	6.107481	9092.263 1854.063
7703	9	i	6.6	0.13	1981	2396.78	0.858	311.5817	
55492	9	i	5.7	0.10	1982	1250.12	0.57	126.0124	
8014	9	i	6.5	0.26	1981	2340.01	1.69	608.4030	
7406	9	i	5.7	0.28	1983	1260.12	1.596	352.8349	
8917	9	i	6.1	3.90	1980	1961.94	23.79	7651.574	
8700	9	i	6.0	0.64	1980	1818.70	3.84	1163.368	
8137	9	i	6.1	0.10	1981	1961.94	0.61	196.1942	
2545	9	i	4.8	0.03	1982	6.66	0.144	0.199763	
830	9	i	5.7	8.11	1982	1260.12	46.227	10219.61	
12635	9	i	5.9	0.10	1981	1653.14	0.59	165.3138	
7797	9	i	5.7	0.23	1981	1260.12	1.311	285.8286	
12211	9	i	5.6	0.10	1981	1041.55	0.56	104.1553	
12760	9	i	6.3	0.18	1981	2185.80	1.134	393.4448	
7435	9	i	6.2	0.10	1981	2082.72	0.62	208.3715	
2519	9	i	4.7	0.16	1983	0.69	0.752	0.110209	
7374	9	i	5.2	1.80	1976	256.32	9.36	461.2703	
5955	9	i	5.9	0.03	1982	1653.14	0.177	49.59416	
8326	9	i	6.1	0.13	1982	1961.94	0.793	255.0524	
8271	9	i	5.8	0.10	1982	1465.96	0.58	146.5956	
8088	9	i	5.8	0.20	1981	1465.96	1.16	293.1912	
9334	9	i	5.3	1.34	1980	414.05	7.102	554.8270	
12869	9	i	6.5	0.21	1981	2340.01	1.365	491.4024	
7688	9	i	6.4	0.26	1981	2270.45	1.664	590.3165	
12536	9	i	6.0	0.18	1981	1818.70	1.08	327.3661	
7704	9	i	6.4	0.18	1981	2270.45	1.152	408.6806	
92135	9	i	5.2	0.10	1986	256.32	0.52	25.63168	
1585	9	i	5.9	4.00	1979	1653.14	23.6	6612.554	
6092	9	i	5.1	0.80	1977	139.95	4.08	111.9625	
6079	9	i	5.6	0.10	1982	1041.55	0.56	104.1553	
25764	9	i	6.3	0.03	1982	2185.80	0.189	63.57414	
12034	9	i	6.0	0.50	1981	1818.70	3	909.3504	
4405	9	i	6.6	1.70	1977	2396.78	11.22	4074.530	
1042	9	i	5.9	1.00	1977	1653.14	5.9	1653.138	
8026	9	i	5.9	0.13	1981	1653.14	0.767	214.9080	
7460	9	i	5.3	0.21	1981	414.05	1.113	86.55050	
6062	9	i	4.8	0.26	1982	6.66	1.248	1.731334	
7388	9	i	5.7	0.16	1982	1260.12	0.912	201.6199	

	8392	9	i	5.8	0.06	1982	1465.96	0.348	87.95736	
	2542	9	i	5.3	0.30	1982	414.05	1.59	124.2150	
	11769	9	i	5.8	0.23	1981	1465.96	1.334	5.807456	337.1698 1406.312
3613		10	j	5.6	0.10	1982	1041.55	0.56	104.1553	
	96814	10	j	5.2	0.10	1984	256.32	0.52	25.63168	
	10578	10	j	5.6	4.12	1979	1041.55	23.072	4291.198	
	10680	10	j	5.0	0.85	1985	65.07	4.25	55.30894	
	19511	10	j	6.6	0.10	1982	2396.78	0.66	239.6782	
	1129	10	j	5.2	7.40	1983	256.32	38.48	1896.744	
	10737	10	j	7.3	13.50	1978	2581.15	98.55	34845.48	
	1133	10	j	7.2	8.32	1978	2568.93	59.904	21372.67	
	23499	10	j	6.5	0.47	1985	2340.01	3.055	1099.805	
	10865	10	j	5.4	0.54	1985	605.78	2.916	327.1191	
	17546	10	j	5.8	0.10	1986	1465.96	0.58	146.5956	
	10694	10	j	6.5	21.10	1984	2340.01	137.15	49374.24	
	77	10	j	6.5	72.50	1977	2340.01	471.25	169650.9	
	10916	10	j	5.7	0.93	1986	1260.12	5.301	1171.915	
	10717	10	j	6.2	0.10	1982	2083.72	0.62	208.3715	
	10705	10	j	6.9	5.20	1978	2510.06	35.88	13052.31	
	1184	10	j	7.1	20.60	1978	2553.41	146.26	52600.26	
	19588	10	j	6.4	0.10	1982	2270.45	0.64	227.0448	
	1174	10	j	5.9	7.63	1980	1653.14	45.017	12613.44	
	7263	10	j	4.8	0.91	1985	6.66	4.368	6.059671	
	6970	10	j	6.8	1.80	1978	2480.09	12.24	4464.153	
	5398	10	j	6.2	1.20	1977	2083.72	7.44	2500.458	
	10829	10	j	5.9	0.10	1982	1653.14	0.59	165.3138	
	7015	10	j	6.2	1.24	1982	2083.72	7.688	2583.807	
	10854	10	j	5.9	0.57	1985	1653.14	3.363	942.2890	
	10855	10	j	5.9	0.73	1985	1653.14	4.307	1205.791	
	1189	10	j	5.9	26.50	1977	1653.14	156.35	43808.17	
	10516	10	j	5.1	0.10	1984	139.95	0.51	13.99531	
	6	10	j	6.2	13.80	1980	2083.72	85.56	28755.27	
	7027	10	j	6.2	2.18	1982	2083.72	13.516	4542.500	
	65	10	j	7.1	61.30	1984	2552.41	425.23	156524.0	
	10806	10	j	6.1	2.85	1978	1961.94	17.385	5591.534	
	1939	10	j	6.8	0.49	1983	2480.09	2.72	992.0341	
	6981	10	j	6.4	0.67	1982	2270.45	4.288	1521.200	
	18846	10	j	4.3	1.90	1980	-1.00	8.17	-1.89995	
	19547	10	j	6.7	1.20	1982	2442.86	8.04	2931.428	
	18653	10	j	6.2	0.10	1982	2083.72	0.62	208.3715	
	10508	10	j	6.0	0.85	1985	1818.70	5.1	1545.895	
	9963	10	j	6.0	1.33	1980	1818.70	7.98	2418.872	
	24856	10	j	5.5	0.10	1982	819.42	0.55	81.94187	
	7007	10	j	6.1	0.08	1982	1961.94	0.488	156.9553	
	1165	10	j	6.5	31.29	1977	2340.01	203.385	73218.96	
	9662	10	j	5.9	0.36	1980	1653.14	3.304	925.7576	
	10624	10	j	6.5	3.60	1978	2340.01	23.4	6.553199	8424.041 2214.937
	35753	11	k	6.3	0.13	1983	2340.01	0.845	304.2015	
5283		11	k	5.7	0.10	1980	1260.12	0.57	126.0124	
	17365	11	k	5.7	1.10	1983	1260.12	6.27	1386.137	
	19864	11	k	6.3	7.90	1976	2185.80	49.77	17267.85	
5252		11	k	6.4	0.10	1980	2270.45	0.64	227.0448	
	18927	11	k	6.1	0.47	1978	1961.94	2.867	922.1127	
	12828	11	k	6.6	0.13	1981	2396.78	0.858	311.5817	
	8220	11	k	6.3	2.97	1978	2185.80	18.711	6491.840	
7948		11	k	5.9	0.10	1985	1653.14	0.59	165.3138	

	19908	11	k	5.0	18.90	1983	65.07	94.5		1229.810	
	297	11	k	6.4	5.46	1981	2270.45	34.944		12396.64	
	7712	11	k	7.1	0.26	1983	2553.41	1.846		663.8868	
	255	11	k	6.9	2.10	1979	2510.06	14.49		5271.127	
	250	11	k	7.1	2.02	1977	2553.41	14.342		5157.889	
	35811	11	k	5.7	0.13	1984	1260.12	0.741		163.8162	
	261	11	k	6.6	7.60	1978	2396.78	50.16		18215.54	
	7923	11	k	6.5	0.16	1981	2340.01	1.04		374.4018	
	16992	11	k	6.5	3.20	1983	2340.01	20.8		7488.036	
	17081	11	k	7.8	0.05	1980	2613.95	0.39		130.6977	
	19681	11	k	5.8	1.49	1977	1465.96	8.642		2184.274	
	13362	11	k	6.2	0.62	1984	2083.72	3.844		1291.903	
	8147	11	k	6.3	0.10	1981	2185.80	0.63		218.5804	
	86676	11	k	6.8	0.10	1980	2400.09	0.68		248.0085	
	28304	11	k	6.3	19.50	1983	2185.80	122.85		42623.19	
	35703	11	k	6.4	0.05	1983	2270.45	0.32		113.5224	
	17112	11	k	6.8	0.56	1983	2400.09	3.808		1388.847	
	38665	11	k	5.9	0.10	1980	1653.14	0.59		165.3138	
	669	11	k	6.4	6.31	1978	2270.45	40.284		14326.52	
	8155	11	k	5.7	0.08	1981	1260.12	0.456		100.8099	
	16792	11	k	6.4	1.04	1980	2270.45	6.656		2261.266	
	35700	11	k	6.5	0.16	1983	2340.01	1.04		374.4018	
	17320	11	k	5.7	2.62	1981	1260.12	14.924		3301.526	
	86695	11	k	6.1	0.10	1980	1961.94	0.61	6.064846	196.1942	1717.283
	20157	12	l	6.2	40.70	1984	2083.72	252.34		84807.22	
	20434	12	l	6.1	39.90	1983	1961.94	243.39		78281.48	
	677	12	l	6.2	20.30	1984	2083.72	125.86		42299.42	
	20882	12	l	6.0	2.05	1984	1818.70	12.3		3728.336	
	26712	12	l	5.8	6.03	1982	1465.96	34.974		8839.714	
	20075	12	l	4.8	30.00	1983	6.66	144		193.7693	
	2116	12	l	6.7	3.30	1984	2442.86	22.11		8061.428	
7943		12	l	6.1	0.10	1985	1961.94	0.61		196.1942	
	26585	12	l	7.1	18.57	1977	2553.41	131.847		47416.83	
	26146	12	l	6.6	4.50	1984	2396.78	29.7		10785.52	
	26207	12	l	4.5	3.80	1983	-0.98	17.1		-3.71287	
	26290	12	l	6.5	6.50	1984	2340.01	42.25		15210.07	
	28020	12	l	8.0	0.40	1983	2613.60	3.2		1047.838	
	26191	12	l	6.7	0.54	1984	2442.86	3.618		1319.142	
	20312	12	l	6.1	5.31	1982	1961.94	32.391		10417.91	
	26077	12	l	5.3	0.50	1983	414.05	2.65		207.0250	
7522		12	l	6.2	0.10	1982	2083.72	0.62		208.2715	
	26724	12	l	6.0	6.68	1982	1818.70	40.08		12148.92	
	20456	12	l	6.3	1.97	1982	2185.80	12.411		4306.035	
	28203	12	l	6.1	2.60	1983	1961.94	15.86		5101.049	
	20092	12	l	5.9	3.40	1980	1653.14	20.06		5620.671	
	26040	12	l	4.4	0.30	1983	-1.00	1.32		-0.29966	
	27761	12	l	7.4	0.10	1983	2590.97	0.74		259.0971	
8306		12	l	5.9	0.10	1980	1653.14	0.59		165.3138	
	19982	12	l	4.8	0.57	1981	6.66	2.736		3.795618	
	26242	12	l	5.8	0.67	1984	1465.96	3.886		982.1905	
	632	12	l	6.3	4.35	1985	2185.80	27.405		9508.251	
	26680	12	l	7.3	19.13	1977	2581.15	139.649		49377.34	
	26717	12	l	6.4	4.58	1982	2270.45	29.312	6.135252	10398.65	1809.705
9580		13	m	6.1	0.19	1981	1961.94	1.159		372.7689	
9597		13	m	6.0	0.76	1981	1818.70	4.56		1382.212	
	28302	13	m	6.4	19.40	1984	2270.45	124.16		44046.69	

b9535		13	a	6.6	0.05	1981	2396.78	0.33	119.8391	
b9546		13	a	6.2	0.25	1981	2083.72	1.55	520.9289	
b9565		13	a	6.2	0.49	1981	2083.72	3.038	1021.020	
b9606		13	a	6.2	0.10	1982	2083.72	0.62	208.3715	
b9610		13	a	6.1	0.10	1982	1961.94	0.61	196.1942	
b9506		13	a	6.1	0.11	1980	1961.94	0.671	215.8136	
b9583		13	a	5.8	0.16	1981	1465.96	0.928	234.3529	
b9564		13	a	6.4	0.24	1981	2270.45	1.526	544.9075	
b9524		13	a	6.4	0.10	1980	2270.45	0.64	227.0448	
b9577		13	a	6.5	0.10	1981	2340.01	0.65	234.0011	
b9528		13	a	6.2	0.19	1980	2083.72	1.178	395.9059	
	31680	13	a	4.5	0.10	1984	-0.98	0.45	-0.09770	
b9568		13	a	6.0	0.35	1981	1818.70	2.1	636.5453	
b9571		13	a	5.9	0.28	1981	1653.14	1.652	462.8788	
b9574		13	a	5.8	0.22	1981	1465.96	1.276	322.5103	
	7931	13	a	6.3	0.21	1981	2185.80	1.323	459.0190	
b9588		13	a	5.9	0.41	1981	1652.14	2.419	677.7868	
	1217	13	a	6.0	986.79	1974	1818.70	5920.74	1794673.	
	95	13	a	6.8	205.00	1983	2480.09	1394	508417.5	
d4220		13	a	6.0	0.10	1982	1818.70	0.6	181.8700	
	25	13	a	6.6	76.20	1983	2396.78	502.92	182634.8	
	18993	13	a	5.1	1.40	1985	139.95	7.14	195.9344	
b9594		13	a	6.2	0.40	1981	2083.72	2.48	833.4862	
d4223		13	a	5.9	0.10	1982	1653.14	0.59	165.3138	
b9515		13	a	5.4	0.11	1980	605.78	0.594	66.63539	
b9549		13	a	6.1	0.41	1981	1961.94	2.501	804.3962	
b9555		13	a	6.6	0.34	1981	2396.78	2.244	814.9061	
d5408		13	a	6.1	0.10	1982	1961.94	0.61	196.1942	
b9561		13	a	5.9	0.24	1981	1653.14	1.416	396.7532	
b9512		13	a	6.4	0.04	1980	2270.45	0.256	90.81793	
b9552		13	a	6.4	0.23	1981	2270.45	1.472	522.2031	
c7936		13	a	6.2	0.10	1982	2083.72	0.62	208.3715	
b9534		13	a	3.8	0.09	1981	-1.00	0.342	-0.09	
b9518		13	a	6.4	0.04	1980	2270.45	0.255	90.81793	
b9539		13	a	5.4	0.21	1981	605.78	1.134	127.2129	
b9591		13	a	5.9	0.29	1981	1653.14	1.711	479.4102	
b9543		13	a	5.8	0.18	1981	1465.96	1.044	263.8720	
b9556		13	a	6.1	0.44	1981	1961.94	2.684	863.2545	
b9521		13	a	3.9	0.12	1980	-1.00	0.468	-0.12	
b9603		13	a	5.9	0.10	1982	1653.14	0.59	165.3138	
b9509		13	a	6.0	0.19	1980	1818.70	1.14	345.5531	
c7939		13	a	6.5	0.10	1982	2340.01	0.65	234.0011	
	28222	13	a	6.7	0.10	1982	2442.86	0.67	6.166772	244.2857 1962.10

BIBLIOGRAPHY

ANONYME, 1986. Répertoire hydrologique 1985. Ministère de l'Environnement, Direction des relevés aquatiques. 148 p.

FRENETTE, J.J., 1986. Effet de l'acidité sur les communautés ichtyologiques de 17 lacs du Témiscamingue. Direction des relevés aquatiques, ministère de l'Environnement du Québec, Publication no. PA-23: 102 p.

JENKINS, R.M. et D.I. MORAIS. 1971. Reservoir sport fishing effort and harvest in relation to environmental variables. Am. Fish. Soc. Spec. Publ. No. 8: 371-384.

HENDERSON, H.H., R.A. RYDER et A.W. KUDHONGANIA. 1973. Assessing fishery potentials of lakes and reservoirs. J.Fish. Res.Board Can. 30: 2000- 2009.

HENDERSON, H.F. et R.L WELCOMME. 1974. The relationship of yield to morphoedaphic index and numbers of fishermen in African Inland fisheries. FAO. CIFA. occasional paper No. 1: 19 p.

LORANGER, S., P.P. HAZEL, B. SCHERRER et R. FORTIN. 1986. Applicabilité de l'indice morphoédaphique pour prédire le rendement de la pêche sportive dans les lacs du territoire à accès contrôlé du Québec. Université du Québec à Montréal, pour le ministère du Loisir, de la Chasse et de la Péche du Québec, Direction de la faune aquatique, Service des espèces d'eau fraiche, Québec. Rapp. tech. 86-06: 135 p.

MINNS, C.K.,J.R. M. KELSO, et M. G. Johnson. 1986. Large-scale risk assessment of acid rain impacts on fisheries: models and lessons. Can. J. Fish. Aquat. Sci. 43: 900-921

RICHARD, Y., 1986. Effets de l'acidité sur les populations ichtyologiques de la ZEC des Martres, Charlevoix, Québec, Direction des relevés aquatiques, ministère de l'Environnement du Québec, Publication no. PA-22, Envirodoq No. 850741, 47 p.

RYDER, R.A., 1965. A method for estimating the potential fish production of North-temperate Lakes. Trans.Am.Fish.Soc. 94: 214-218.

RYDER, R.A.,S.R. KERR, K.H.LOFTUS, et H.A. REGIER. 1974. The morphoedaphic index, a fish yield estimator-review and evaluation. J.Fish. Res. Board Can. 31: 663-688

RYDER, R.A. 1981. The morphoedaphic Index - Use, Abuse, and fundamental Conceps. Trans. Am. Fish. Soc. 111: 154-164.